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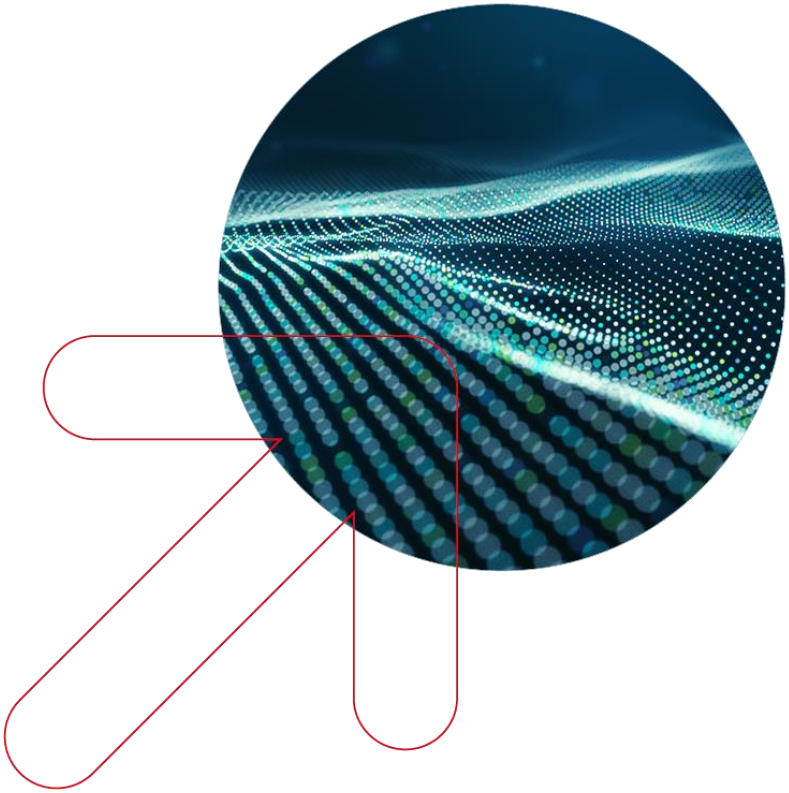

Interoperability for number-independent interpersonal communications services under the DMA: More harm than good?

Authors:
Serpil Taş
Lukas Wiewiorra
Andrea Liebe

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WIK Wissenschaftliches Institut für
Infrastruktur und Kommunikationsdienste GmbH
Rhöndorfer Str. 68
53604 Bad Honnef
Germany
Tel.: +49 2224 9225-0
Fax: +49 2224 9225-63
E-Mail:info@wik.org
www.wik.org

Authorised representatives and signatories

Managing Director and Director	Dr Cara Schwarz-Schilling
Director	Alex Kalevi Dieke
Director Head of Department Networks and Costs	Dr Thomas Plückebaum
Director Head of Department Regulation and Competition	Dr Bernd Sörries
Head of Administration	Karl-Hubert Strüver
Chairman of the Supervisory Board	Dr Thomas Solbach
Commercial Register	Local Court Siegburg, HRB 7225
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1 Introduction

Consumers in Germany are increasingly integrating number-independent interpersonal communication services (NI-ICS) into their communication behaviour, rather than relying exclusively on traditional number-based interpersonal communication services (NB-ICS) such as fixed-line or mobile telephony and SMS. The former category includes a variety of different messaging, internet telephony, video telephony and videoconferencing services[1] that allow "direct interpersonal and interactive exchange of information via electronic communications networks between a finite number of persons, whereby the persons initiating or participating in the communication determine its recipient(s)" (Directive (EU) 2018/1972, Art. 2(5)). However, unlike NI-IBS, these NI-ICS do not connect or enable communication with numbers in national or international numbering plans (Directive (EU) 2018/1972[2], Art. 2, para. 7).

This study mainly discusses the current use of NI-ICS in Germany and also presents possible future developments. In light of the Digital Markets Act (DMA)[3] and associated obligation to provide interoperability, the way consumers communicate and use NI-ICS may change in the future. In general, the term “interoperability” refers to the ability of systems or components thereof to work together seamlessly so that information can be exchanged and the information exchanged can be used (Geraci et al., 1991; Ostermann & Jooß, 2022). While interoperability exists through standardisation for traditional communication services such as fixed-line and mobile telephony and SMS, NI-ICS – apart form of e-mail services – are currently not interoperable with each other as they are often based on proprietary systems. From a consumer perspective, this means that messages or calls cannot be sent from one NI-ICS (e.g. WhatsApp) to another (e.g. Signal). The DMA requires gatekeepers and their NI-ICSs, designated as central platform services, to provide a reference offer that includes technical details and general terms and conditions for interoperability. Third party providers of NI-ICS may choose to accept this offer and design their services to be interoperable with those of the gatekeepers. This may affect the consumer's choice of communications services.

The aim of this study is to analyse the impact of the interoperability obligation contained in the DMA on the usage of NI-ICS. To this end, an online consumer survey was conducted in November 2023, involving 2,826 participants from Germany, to collect information on how interpersonal communication services (ICS) in general and NI-ICS in particular are used. The study is structured as follows: Chapter 2 presents the data collection and methodological aspects of the analysis. Chapter 3 provides an overview of the current adoption and use of ICS in Germany. Chapter 4 examines the DMA and its interoperability obligation in detail. This chapter also discusses the theoretical consequences of the obligation in relation to the current usage of NI-ICS. An analysis of future consumer behaviour following the introduction of interoperability is presented in Chapter 5. The study concludes with a discussion of the findings and methodological limitations.

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1 See BEREC (2023).
2 Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 established the European Electronic Communications Code, Official Journal of the European Union, L 321/36.
3 Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), Official Journal of the European Union, L 265/1.

2 Data collection and method

The online consumer survey for this study was conducted in November 2023 using Computer Aided Web Interviewing (CAWI). The sample size consisted of 2,826 participants. Quota sampling was used to ensure that the sample adequately represented the German population aged 18+. Age, gender and region were the main characteristics used to draw the sample for this study. Due to minor deviations in the age, gender and regional composition of the actual sample from the population, post-stratification weights were calculated and used in the analyses.

Table 2-1: Composition of the sample (2023) and the population (2022)

Sex, age, Nielsen areas		Survey sample	General population (German population aged 18 and over)
Sex	Female	52%	51%
	Male	48%	49%
Age	18-24 years	7%	9%
	25-34 years	15%	15%
	35-44 years	15%	15%
	45-54 years	16%	15%
	55+ years	47%	45%
Nielsen areas	1: Bremen, Hamburg, Lower Saxony, Schleswig-Holstein	17%	16%
	2: North Rhine-Westphalia	22%	21%
	3a: Hesse, Rhineland-Palatinate, Saarland	14%	14%
	3b: Baden-Württemberg	12%	13%
	4: Bavaria	16%	16%
	5: Berlin	4%	4%
	6: Brandenburg, Mecklenburg-Western Pomerania, Saxony-Anhalt	8%	8%
	7: Saxony, Thuringia	7%	7%

Source: Own illustration based on data from the Statistisches Bundesamt (Destatis) (2023) and the online consumer survey (unweighted values).

The questionnaire consisted mainly of closed questions and was administered in German. SPSS software was used for data processing and analysis.

Throughout the study, a distinction is made between ICS, NB-ICS and NI-ICS users. Users of these types of services are defined as respondents who reported having used at least one of the services listed in the respective row of Table *2-2* in the four weeks/one month prior to the survey. These communication services were selected for the survey in order to be able to analyse the use of ICS, NB-ICS and NI-ICS at service level in more detail. In most evaluations, e-mail services are excluded from the NI-ICS category as they are not covered by the DMA interoperability obligation due to existing interoperability of e-mail services. Where they are included, this is explicitly stated.[4]

Social networks and platforms with a direct messaging function are in most parts excluded from the following analysis. The distinction between social networks with a direct messaging function and NI-ICS is not always clear and does not prejudge any legal definition. In this study, we therefore distinguish between services where interpersonal communication is a purely secondary function (e.g. LinkedIn chat, X [formerly Twitter] direct messaging) and services where the focus is on interpersonal communication

4 For the categorisation of e-mail services as NI-ICS, see BEREC (2023).

but where social networking elements may be included as a secondary function (e.g. WhatsApp communities).

Table 2-2: Services selected as part of the survey

Category	Subcategory		Services
Interpersonal communications services (ICS)	Number-based interpersonal commuication services (NB-ICS)		Fixed-line telephony, mobile telephony and SMS
	Online communications service	**Number-independent interpersonal communication services (NI-ICS)**	E-mail services Messaging services WhatsApp, iMessage, Facebook Messenger, Snapchat, Threema, Signal, Telegram, Google communication services[5], WeChat Video/audio/enterprise services: Skype, FaceTime, Discord, Slack, Microsoft Teams, Zoom und Cisco Webex
Social networking services (SNS)		Services with a direct messaging feature (DM)	Mixed use: X (formerly Twitter), Instagram Professional: LinkedIn Dating: Tinder, Bumble, Lovoo.

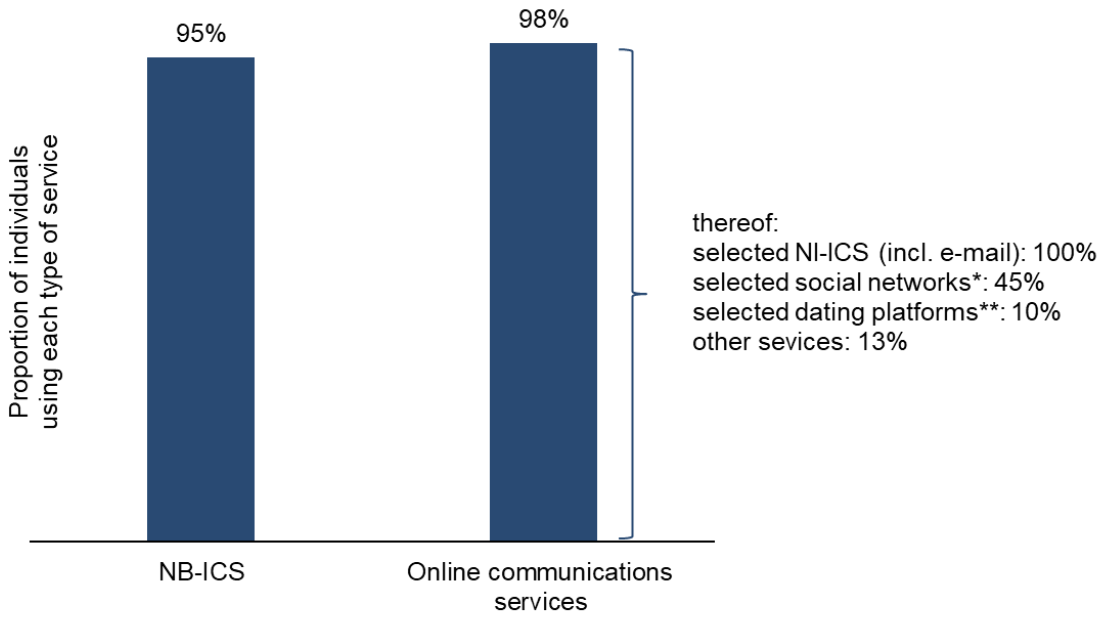
Source: Own illustration.

5 Due to the frequent rebranding of Google's communication services, these were summarised as one item in the survey. Respondents who use at least one of Google's services, e.g. Hangouts, Chat, Meet, Messages etc., were able to select this item.

3 Use of ICS in Germany

Currently, 95% of consumers surveyed use one of the traditional NB-ICS: fixed-line and mobile telephony or SMS. At the same time, a similarly high proportion (98%) of respondents use at least one online communications service to communicate with others, be it NI-ICS or social networking services with an instant messaging function The following sections look in more detail at the usage of those ICSs selected for the survey.

Figure 3-1: Use of different types of services for communication purposes



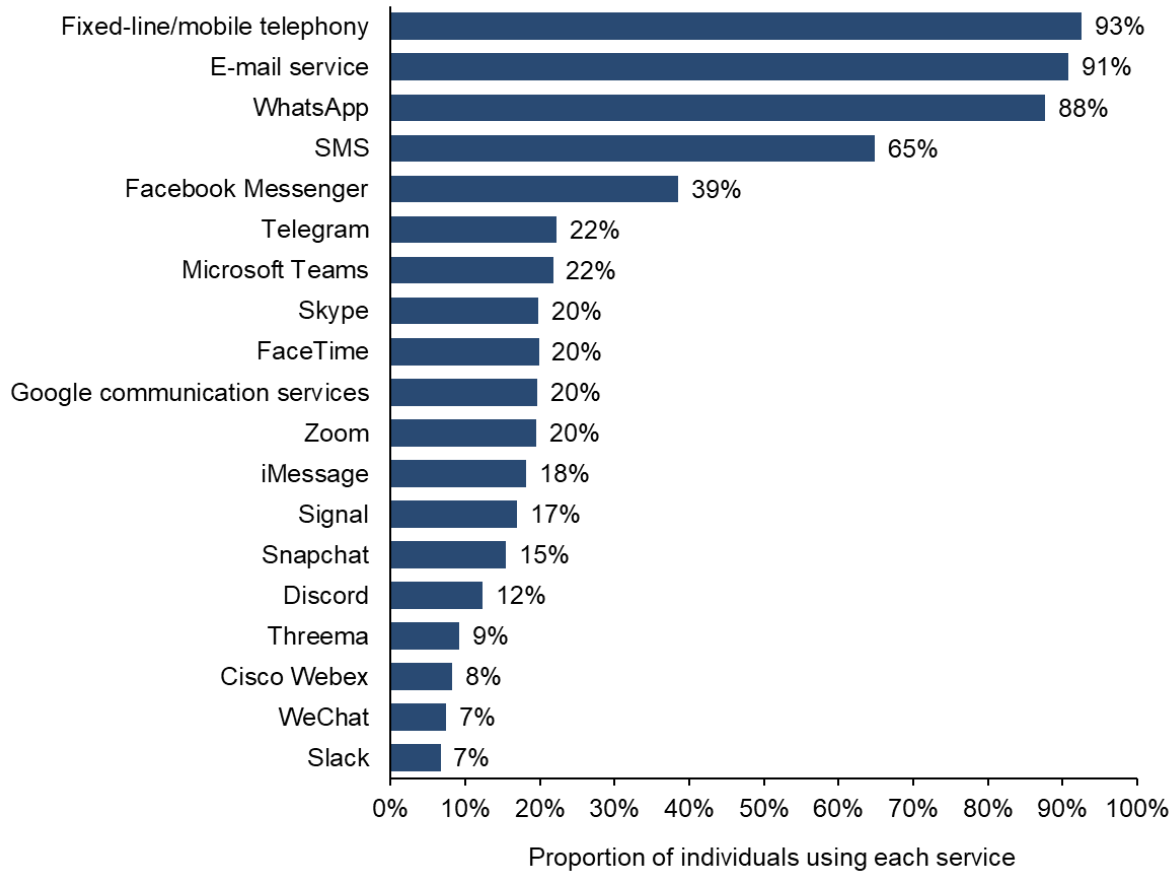
Source: Own illustration. Basis: All respondents, N=2,826. *selected social networks: X, Instagram, LinkedIn. **Selected dating platforms: Tinder, Bumble, Lovoo.

3.1 Usage and importance of individual ICS

In addition to traditional fixed-line and mobile telephony (93%), the most popular ICS in Germany are e-mail services and WhatsApp with user shares of 91% and 88% respectively. WhatsApp's user share is thus much higher than that of other well-known NI-ICS such as Facebook Messenger (39%), Telegram (22%) and Skype (20%). For the purposes of this study, users are defined as respondents who reported that they have contacted another person via the respective service or have been contacted by another person.[6]

6 The observation period covers the last four weeks before the survey.

Figure 3-2: User shares of ICS



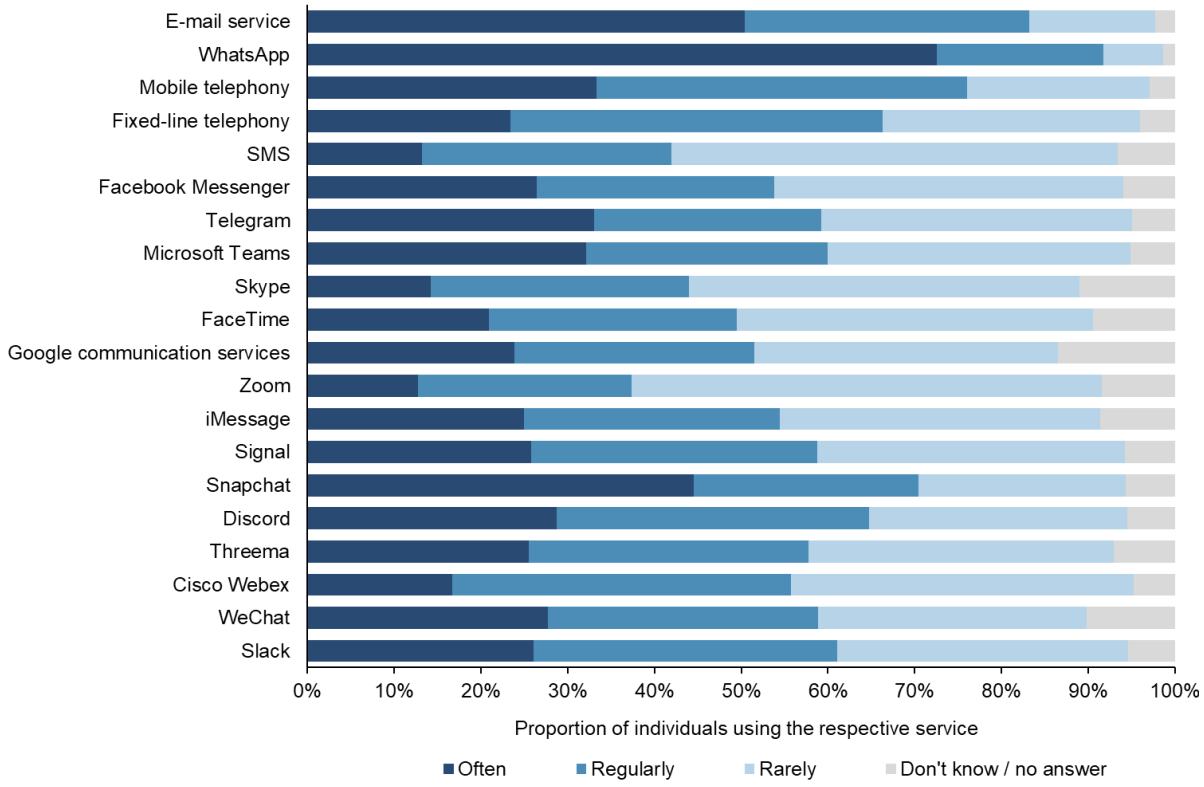
Source: Own illustration. Basis: All respondents, N=2,826. Multiple answers were permitted.

E-mail services and WhatsApp do not only have the largest share of users, but are also used frequently (at least once a day) by the majority of their users. Despite similarly high shares of users, fixed-line and mobile telephony are used comparatively less frequently. Most users report using them several times a week, but rarely several times a day.

When consumers are asked which service is most important to them for communicating with others, WhatsApp is likely to be their answer. In fact, 53% of ICS users surveyed consider WhatsApp to be the most important service for them. This is followed by fixed-line or mobile telephony, which is considered the most important service by 23% of ICS users. Despite its frequent use and large user base, e-mail is considered the most important service for only 13% of ICS users surveyed. The other services appear to play a secondary role for users. For each of the remaining NI-ICS, less than 2% of ICS users indicate that the respective service plays a decisive role in their communication behaviour.[7]

7 Basis: ICS users, N=2,782. However, 86 cases in which the ICS users did not consider any of the ICS in question to be important were not included in the analysis. All shares: Respondents who find at least one of the services Cisco Webex, FaceTime, Google communication services, Skype, Slack, Snapchat, Threema, WeChat or Zoom most important: 3%; respondents who find at least one of the services Discord, Facebook Messenger, iMessage, Microsoft Teams, Signal, SMS or Telegram most important: 8%; respondents who find e-mail service most important: 13%; respondents who find fixed-line/mobile telephony most important: 23%; respondents who find WhatsApp most important: 53%.

Figure 3-3: Frequency with which ICS are used



Source: Own illustration. Basis: Respective service users, N=185-2,574 depending on the service. Rarely: At most once a week. Regularly: Two to several times a week. Often: At least once a day.

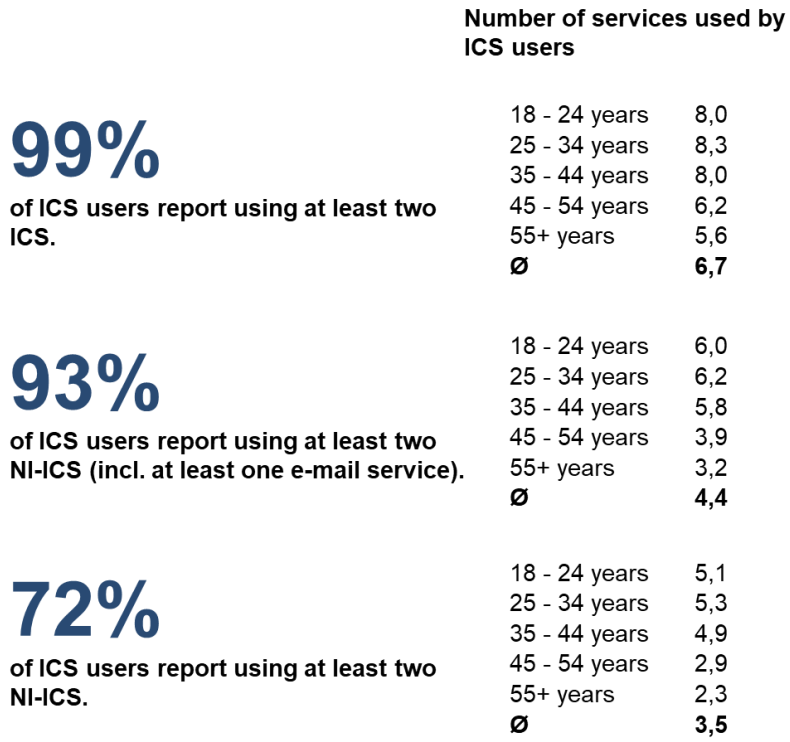
3.2 Multihoming

Consumers typically use a combination of different channels to communicate with one another. This is also true for ICS. Of the 20 ICS analysed, 98% of respondents use at least one. Of these ICS users, 99% report using at least two ICS. This group is hereafter referred to as multihomers. In turn, this means that only 1% of the ICS users are singlehomers and use only one ICS.

The average number of services used by ICS users is around 6.7. However, as the age of a user increases, the number of services used decreases. ICS users aged 18-24 use an average of 8 services, while ICS users over 55 use an average of only 5.6 services.

Looking at NI-ICS (incl. e-mail) only, the proportion of multihoming remains at a similarly high level, but the average number of services used falls by around 2.3. This suggests that traditional telecommunication services are part of the standard set of communication services used by ICS users. This also applies to e-mail. If this service is excluded from the evaluation, the average number of services used falls to 3.5.

Figure 3-4: Multihoming

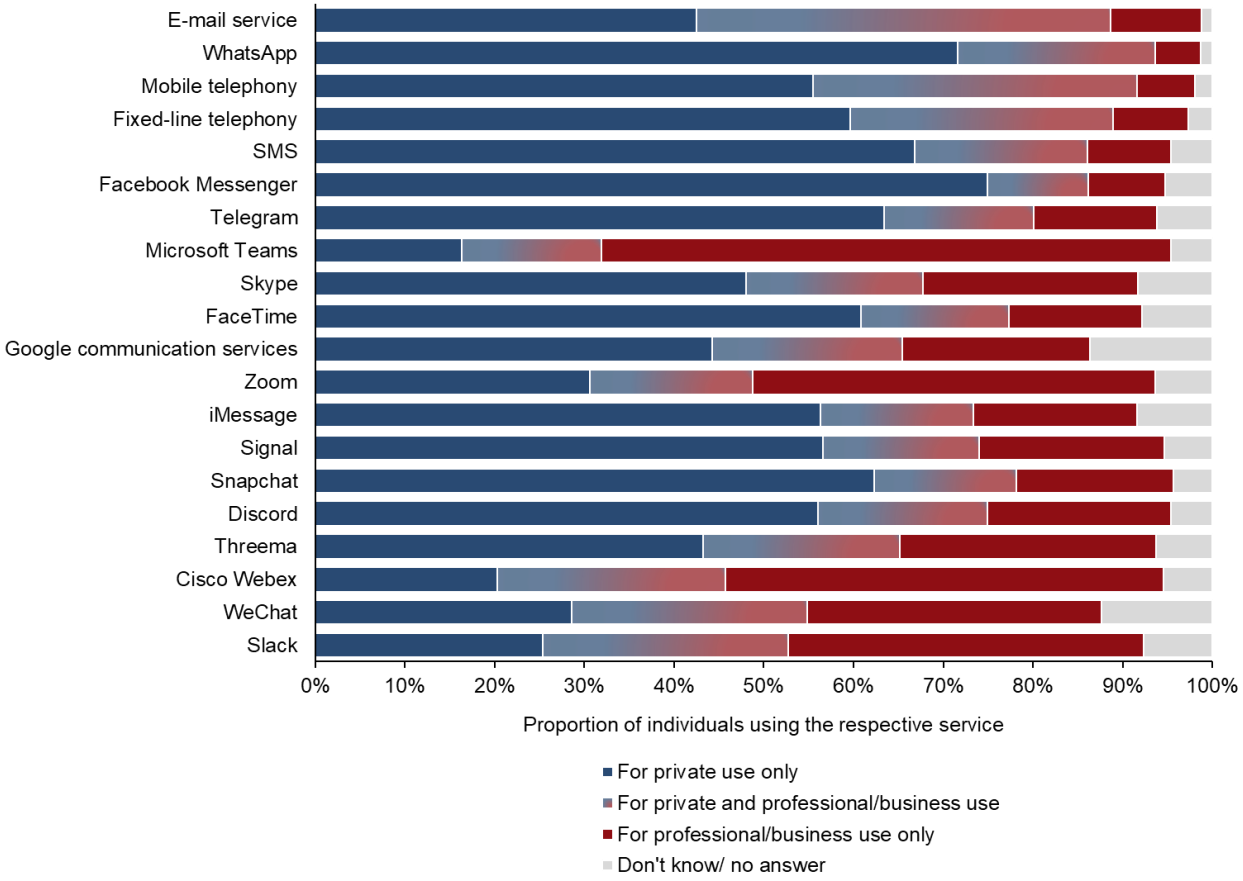


Source: Own illustration. Basis: ICS users, N=2,782. 20 communication services analysed: Fixed-line telephony, mobile telephony, SMS, email, WhatsApp, iMessage, Facebook Messenger, Snapchat, Threema, Signal, Telegram, Skype, FaceTime, Google communication services, WeChat, Discord, Slack, Microsoft Teams, Zoom and Cisco Webex.

ICS are used in both professional and private settings. In most cases, however, private use dominates. Even e-mail services are used by a larger proportion of their users for work than for private purposes. This is also the case for fixed-line and mobile telephony. Conferencing services like Slack, Microsoft Teams, Zoom or Cisco Webex are an outlier. They are more corporate in nature.

Preferring to use certain services in a business or private context may increase the total number of services used. For this reason, the following sections examine multihoming separately for private and business use.

Figure 3-5: ICS by private and professional use



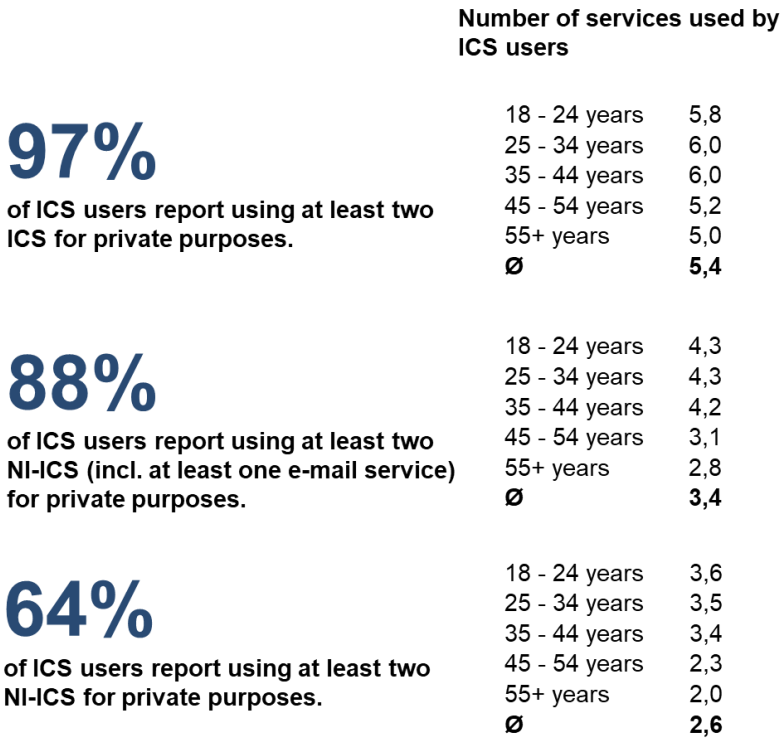
Source: Own illustration. Basis: Respective service users, N=185-2,574 depending on the service.

Multihoming - Using ICS for private purposes

The analysis of multihoming in private ICS use shows little difference from the overall picture presented in the previous section. The proportion of multihomers among ICS users is still close to 100% when both NB-ICS and NI-ICS are taken into account. However, compared to the overall analysis of multihoming above, the average number of services used is around 1.3 lower. This suggests that these are services used exclusively for business purposes.

Again, it is evident that the number of services used decreases with age and that traditional telecommunications services and e-mail services are part of the standard set of communication services used. Considering only NI-ICS, the average number of services used is 2.6. Given its widespread use, WhatsApp might be one of these services for many users.

Figure 3-6: Multihoming - private use



Source: Own illustration. Basis: ICS users, N=2,782. 20 communication services analysed: Fixed-line telephony, mobile telephony, SMS, email, WhatsApp, iMessage, Facebook Messenger, Snapchat, Threema, Signal, Telegram, Skype, FaceTime, Google communication services, WeChat, Discord, Slack, Microsoft Teams, Zoom and Cisco Webex.

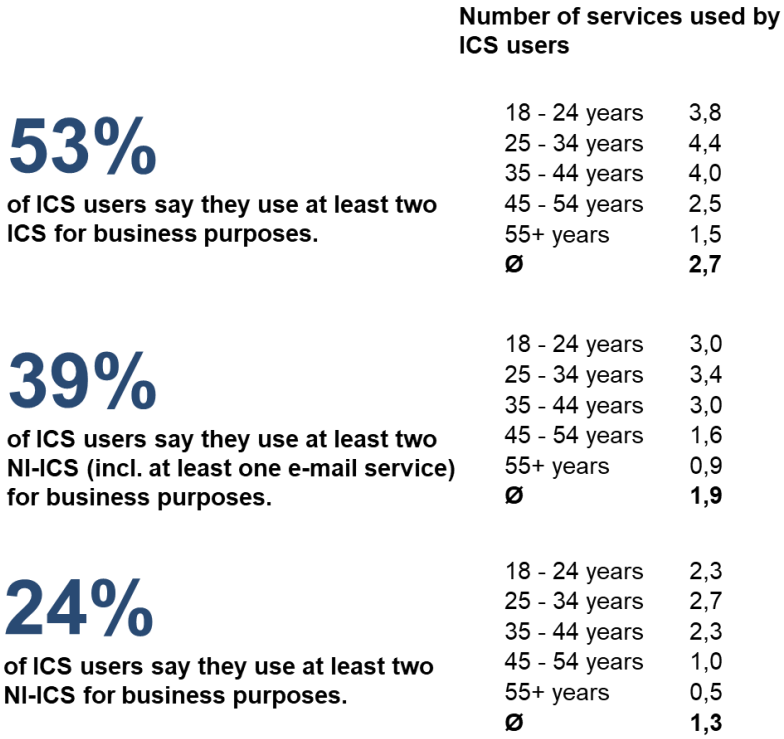
Multihoming - Using ICS for business purposes

Multihoming is much less common when ICS are used for work than when they are used for private purposes. Taking into account all the ICS analysed, the proportion of multihomers among ICS users is around 53%. On average, only 2.7 services are used for business purposes. If traditional telecommunication services are excluded, both the proportion of multihomers and the average number of services used drops. Excluding e-mail services also has a negative impact on the total number of services used.

Unlike previously, the number of services used does not decline continuously with age. On average, most services are used by consumers aged between 25 and 44. This may in particular be due to the fact that younger consumers have not yet entered the labour force, while older consumers have already left it.

A further important difference between using services for private and business purposes is that individuals, especially employees, generally have no influence over which communication services they use. The decision is usually made by their employer.

Figure 3-7: Multihoming - professional use



Source: Own illustration. Basis: ICS users, N=2,782. 20 communication services analysed: Fixed-line telephony, mobile telephony, SMS, email, WhatsApp, iMessage, Facebook Messenger, Snapchat, Threema, Signal, Telegram, Skype, FaceTime, Google communication services, WeChat, Discord, Slack, Microsoft Teams, Zoom and Cisco Webex.

This chapter shows that ICS users multihome and combine different ICS, whether for business or private purposes. However, the data also show that the number of services used drops relatively sharply when only NI-ICS are considered. Moreover, with the exception of WhatsApp, most of the other NI-ICS play a secondary role for consumers. They are used less frequently and are on average less important.

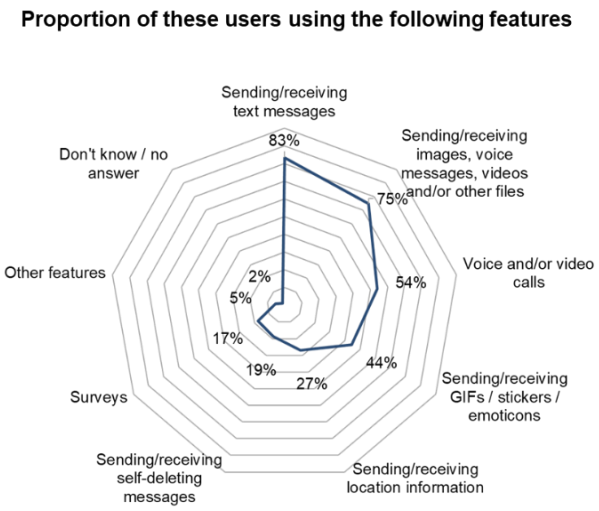
3.3 Communication features of NI-ICS

Many NI-ICS not only allow users to communicate by voice or text, but also to connect with others in a variety of ways. They typically offer a wide range of features. These include the ability to send pictures, videos and files, the use of geo-localisation and, in some cases, the ability to conduct transactions (Arnold et al., 2017). They also offer flexibility in choosing which people and groups to communicate with. Users have the ability to decide whether they want to share information directly with a single person, or whether the information should be shared in groups, or even flow across entire communities.

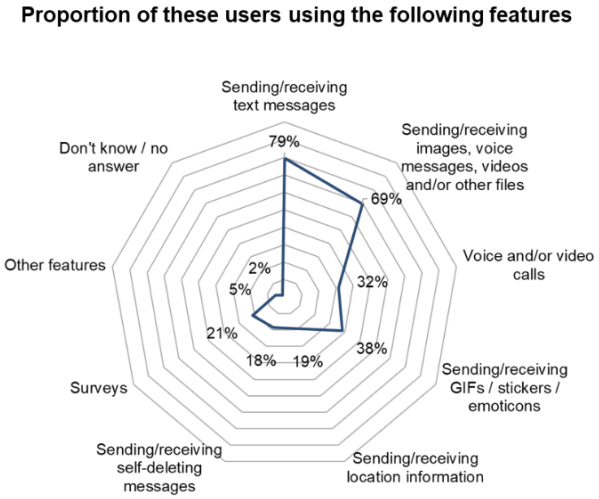
To this end, this study analyses common communication features of NI-ICS and investigates which of the three communication modalities - 1) communication with individual contacts, 2) within groups, and 3) within communities/channels - they are used in. In addition, the use of features that serve the exchange of information but exist independently of these three communication modes is also analysed (see Figure 3-8).

Figure 3-8: Communication features by communication mode

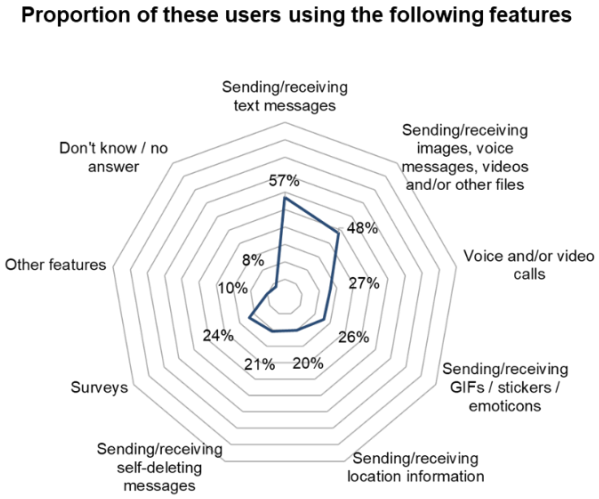
86%
of NI-ICS users surveyed communicate with single contacts.



56%
of NI-ICS users surveyed communicate within groups.



14%
of NI-ICS users surveyed communicate within communities/channels.



Source: Own illustration. Basis: NI-ICS users, N=2,650. Multiple answers were permitted.

Overall, the majority of NI-ICS users indicate that they use these services for bilateral communication with individuals (86%). This is the most important mode of communication for 79% of NI-ICS users. The other two modes play a secondary role for NI-ICS users in terms of their use and relevance for interpersonal communication. 56% of NI-ICS users report using NI-ICS for group communication. And even fewer use NI-ICS for communication within communities or channels (14%). In addition, only 11% of NI-ICS users consider it very important to communicate with groups of users or within communities or channels.

Regardless of who individuals are communicating with, the most commonly used features are "sending/receiving text messages" and "sending/receiving pictures, voice messages, videos and/or other files". In fact, 68% of NI-ICS users consider these features to be the most important for their interpersonal communications. This is followed by ”voice and video telephony”. However, only 9% of NI-ICS users say that this feature is critical to their interpersonal communications. The use of other features is less widespread. Overall, there are no discernible patterns in the use of different features by age or gender.

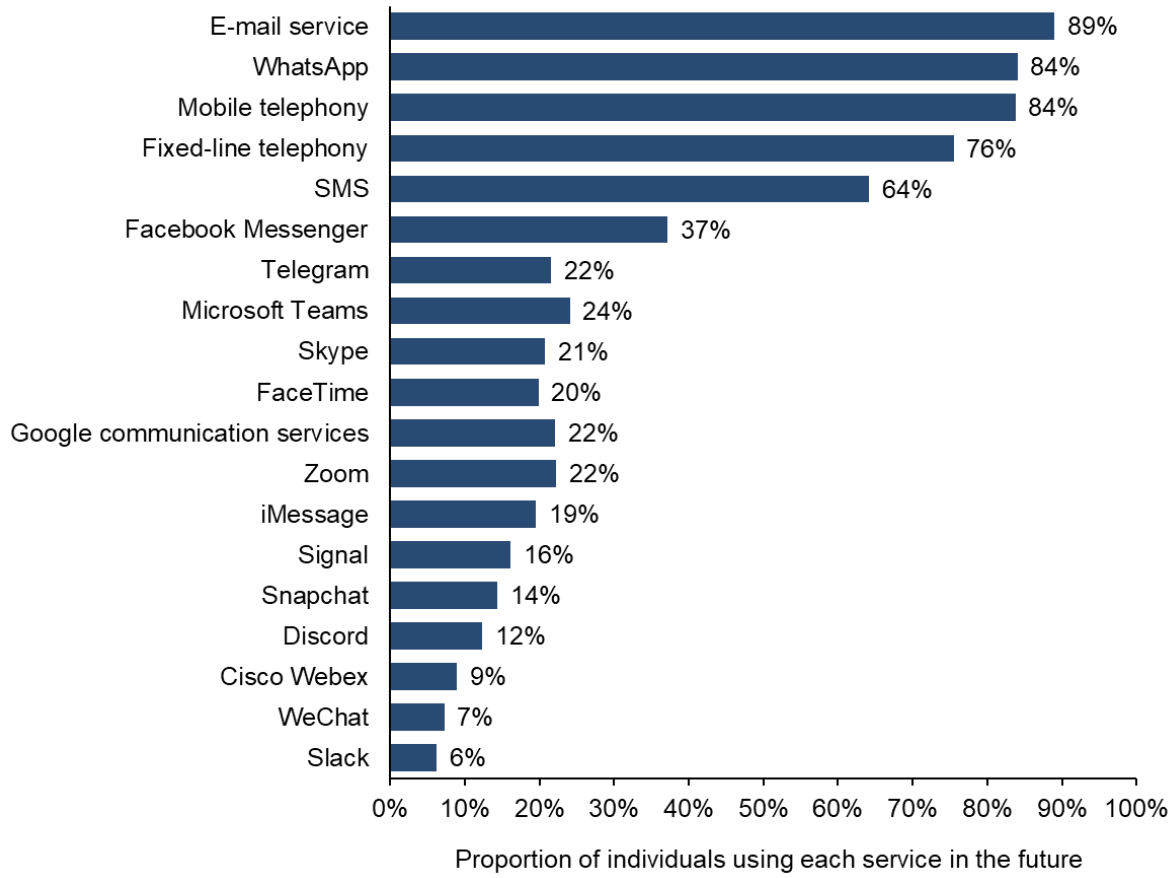
More general information functions that can be used independently of the communication mode, such as stories, status or profile information, are used by 24% of the NI-ICS users surveyed – but are considered important by only 2%.

3.4 Future use of ICS

Some attrition can be expected with regard to the future use of the ICS analysed. In the next 12 months, 32% of the consumer surveyed plan to stop using at least one ICS they currently use. On the other hand, 51% of respondents have plans to use at least one service that is not currently in use. However, this does not have any impact on the average number of services in use by future ICS users.

In addition, WhatsApp will remain the most widely used NI ICS, alongside e-mail services, at least in the short term (over the next 12 months). Facebook Messenger, another service of Meta, is expected to remain in second place.

Figure 3-9: Future use of ICS



Source: Own illustration. Basis: All respondents, N=2,826. The figure shows the proportion of respondents who state that it is "likely" or "very likely" that they will use the respective service in the next 12 months. Multiple answers were permitted.

4 Interoperability obligation for gatekeepers under the Digital Markets Act

Article 7 of the DMA[8] requires gatekeepers to ensure interoperability of their NI-ICS. The first paragraph of the article states that a gatekeeper must "make the basic functionalities of its number-independent interpersonal communications services interoperable with the number-independent interpersonal communications services of another provider […] by providing the necessary technical interfaces or similar solutions that facilitate interoperability, upon request, and free of charge" (DMA, Art. 7, para. 1).

According to the DMA, the basic functionalities are, in particular, direct communication features, which include the exchange of text messages, images, videos, voice messages and other attached files, as well as voice and video telephony between two individual users or within groups. The gatekeeper shall gradually make these features interoperable once they have been designated. The stages in which this shall take place are set out in Art. 7, para. 2 of the DMA. The table below summarises them.

Table 4-1: Timeline for achieving interoperability of basic functionalities

Stage 1	6 months after designation as a gatekeeper	• end-to-end text messaging between two individual end users • sharing of images, voice messages, videos and other attached files in end to end communication between two individual end users
Stage 2	2 years after designation as a gatekeeper	• end-to-end text messaging within groups of individual end users • sharing of images, voice messages, videos and other attached files in end-to-end communication between a group chat and an individual end user
Stage 3	4 years after designation as a gatekeeper	• end-to-end voice calls between two individual end users • end-to-end video calls between two individual end users • end-to-end voice calls between a group chat and an individual end user • end-to-end video calls between a group chat and an individual end user

Source: Own illustration based on Art. 7, para. 2 of the DMA and BEREC (2023).

After the gatekeeper has published a reference offer containing the technical details and general conditions for interoperability with its NI-ICS, any provider of NI-ICS in the European Union may request interoperability from the gatekeeper. The gatekeeper must respond to any reasonable request within three months (DMA, Art. 7, para. 4-5).

In addition, Article 7 of the DMA stipulates that the gatekeeper must maintain the level of security provided to its own end-users for all interoperable services (DMA, Art. 7, para. 3). Furthermore, the gatekeeper may only collect and exchange personal data of users with the other service providers which is absolutely necessary to ensure effective interoperability, in full compliance with the General Data Protection Regulation[9] and the Directive on Privacy and Electronic Communications[10] (DMA, Art. 7, para. 8).

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8 Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), Official Journal of the European Union, L 265/1.

9 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), Official Journal of the European Union, L119/1.

10 Directive 2002/58/EG of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications), Official Journal of the European Union, L201/37.

Thus, the gatekeeper is not „prevented from taking measures to ensure that third-party providers of number-independent interpersonal communications services requesting interoperability do not endanger the integrity, security and privacy of its services, provided that such measures are strictly necessary and proportionate and are duly justified by the gatekeeper“ (DMA, Art. 7, para. 9).

Just as alternative providers of NI-ICS are free to request interoperability, users of the gatekeeper's NI-ICS and those of the requesting provider are free to decide whether they wish to use the basic functionalities in an interoperable manner (DMA, Art. 7, para. 7). This implies that the NI-ICSs that support interoperability will have to provide configuration options to enable and/or disable the interoperable operation of their applications.

In September 2023, the European Commission designated gatekeepers according to the criteria set out in the DMA. These include Meta and Apple, whose services WhatApp, Facebook Messenger and iMessage meet the thresholds set out in the DMA to be considered core platform services. As regards Apple and its iMessage service, a market investigation has been launched to examine Apple's objection that iMessage should not be considered a core platform service (European Commission, 2023). According to media reports, Meta will also challenge its Messenger's classification as a core platform service (Kastrenakes, 2023, Aronssohn, 2023).

The findings in Chapter 3 demonstrate that Meta's two NI-ICS in particular have a large user base in Germany compared to the services of other providers. Almost 90% of the respondents in Germany state that they currently use at least one of the two services to communicate directly with their contacts. WhatsApp alone has a user share of around 88%. Interoperability is seen as a way of countering such concentration tendencies, driven in particular by network effects (BEREC, 2023). These effects ensure that the value that each consumer derives from using a service increases as the number of individuals utilizing the service grows (Crawford et al., 2023).

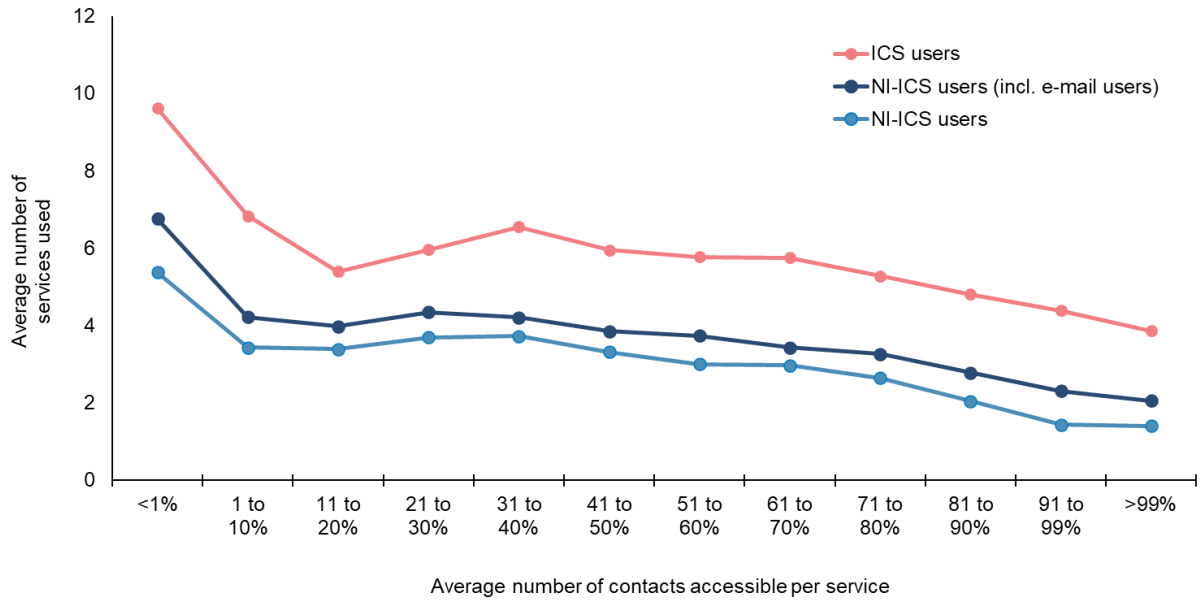
In the absence of interoperability, network effects are service-specific and can therefore drive demand in favour of the service with the largest user base, as consumers derive the greatest benefit from these services. In contrast, interoperability transforms network effects into cross-service network effects, so that users of all services, regardless of its size, can gain access to a large network. As a result, it is envisaged that new services will no longer need to reach a relatively high critical mass of users in order to survive on the market. This may, for example, lower barriers to entry (Bourreau et al., 2022; Crawford et al., 2023). At the same time, interoperability has the effect of reducing switching costs. In addition to the traditional procedural, financial and relational costs associated with switching services, this type of service also involves so-called "collective costs" (Wiewiorra et al., 2022). These are particularly amplified by features such as group calls or chats. For instance, BEREC (2023) describes that if one member of a group conversation wants to change its communication service, all other members would in principle also have to change their service if they all want to continue communicating in that group. This significantly increases switching costs and can lead to lock-in effects, which in turn restrict competition (BEREC, 2023). Interoperability can mitigate this issue by allowing all users to access the same network, regardless of the service. Finally, interoperability would also shift the focus of competition so that, at least in theory, companies would no longer compete for the largest number of users but for other aspects that are important to users, such as quality, innovative features, data security or privacy (Bundesnetzagentur, 2021; Bourreau et al., 2022; BEREC, 2023; Crawford et al., 2023).

If e-mail services are disregarded, there is currently a NI-ICS on the market that obviously has the largest user base. However, as illustrated in Chapter 3, consumers often tend to use not just one communication service but several, often from different providers. In this context, multihoming is often seen as a viable alternative to interoperability (Monopolkommission, 2021; Bourreau et al., 2022). By using or even just installing several services, the individual user potentially has access to a larger network than when using just one service. The service-specific networks remain in place, but the individual user can reach as many networks as desired. If multihoming is widespread on the market and obviously easy to achieve, competitors have the opportunity to reach a critical mass of users and, thus, create network effects on its own. If their service proves to be superior, the market can also shift in their favour (Bourreau et al., 2022).

ICS users generally use several NI-ICS. According to the results of this survey, at least 3,5 NI-ICS are used on average. This includes WhatsApp in particular, which is frequently used by the users surveyed and is very important for the cross-section of consumers surveyed. Although the remaining services are used, they play a subordinate role in interpersonal communication.

In principle, the barrier to using multiple communication services is low, as the monetary costs are low or almost non-existent (BEREC, 2023; Bundeskartellamt, 2021; Bundesnetzagentur, 2021; Bundesnetzagentur, 2023; Taş et al., 2021). One reason for multihoming, is for instance the accessibility of contacts. The choice of communication service depends not only on an individual's own preferences, but also on those of their contacts. If many of an individual's social contacts use different services, then it is more likely that the individual will also use several services. Both the results of the consumer survey (see Figure 4-1) and Taş et al. (2021) show that the average number of services used increases when the accessibility of contacts per service is low. The results of a survey by the Bundesnetzagentur are consistent with this, showing that around 37% of surveyed users of communication services are willing to install an (additional) communication service if a desired communication partner cannot be reached via the service they usually use (Bundesnetzagentur, 2023).

Figure 4-1: Number of services used privately, by proportion of private contacts accessible per service



Source: Own illustration. Basis: ICS users, N=2,758. NI-ICS users (incl. e-mail users), N=2,726. NI-ICS users, N=2,591. Excluding 345, 293 and 248 cases in which the respective users did not provide any information at least once.

The communications service that an individual actually uses can be significantly influenced by the nature and, in particular, the depth of the relationship with the communication partners. For example, participants in a study by Arnold and Schneider (2017) emphasised in structured interviews that WhatsApp and Snapchat, for example, are mostly used to communicate with close contacts, while Facebook and/or Facebook Messenger tend to be used to communicate with contacts with whom the participants have less intimate relationships.

In addition, access to various functionalities can also play a decisive role in multihoming. Most online communications services guarantee the availability of some basic and common features. It is precisely these functionalities that, according to the DMA, should be designed to be interoperable in the future, if requested. In addition, individual services also provide additional features that may well be attractive to consumers. For example, Taş et al. (2021) show that respondents who use at least two communication services and are therefore multihomed value access to a large number of different features and different forms of communication, as well as a selection of pictures, skins/themes and emoticons, more than respondents who use only one communication service.

It is crucial for competition that services can differentiate themselves through their functionalities. As the interoperability obligation of the DMA is currently limited to the basic functionalities of a communications service, providers will still have the opportunity to differentiate themselves through various additional features (Wiewiorra et al., 2022). The effect of such partial interoperability on competition depends heavily on how users value the additional features. If users value additional features, competition will focus on these additional features and market participants will try to differentiate themselves from their competitors by developing new innovative additional features. However, it is important to note that the intended positive effect of interoperability can quickly be outweighed by the intense competition for new features, which continues to be characterised by the degree of service-specific network effects.

A leading service would still have a competitive advantage due to its larger network. On the other hand, if users place little value on new features, interoperability could leave market players with little room for differentiation and the risk of homogenisation of services (Bourreau et al., 2022; Wiewiorra et al., 2022).

While the incentives to innovate on additional features could, at least in theory, be maintained, interoperability could make it more difficult to innovate within the core areas of the feature set - especially those related to privacy and security (Wiewiorra et al., 2022; Bundeskartellamt, 2021). This is particularly detrimental to services whose unique selling point is a high level of privacy, security and anonymity. Communication services today use different protocols, systems and standards, in particular with regard to encryption, identity management and the collection, storage and use of personal data and metadata.

It is important to achieve a balance between the security of metadata and the security of the actual content of communication. When communicating via online communication services, metadata is always generated for purely technical reasons. For example, a service's servers are aware of when and with whom users connect, and which ones interact and how infrequently. In addition to movement/location data and user behaviour data, other metadata that can be generated includes personal data, device/configuration data, contact data, group memberships, etc. This metadata is used for various purposes. On the one hand, they enable users to use certain convenience functions and improve the user experience; on the other hand, the data is also used for advertising purposes. They are sold to external parties or systematically analysed in other ways (BSI, 2021). Services with a high level of data protection use end-to-end encryption and try not to store metadata generated during communication in the first place. For example, not every service requires identification with a mobile phone number. Instead, an anonymous identification number can also be used, as is the case with Threema, for example. Depending on the technical implementation of interoperability, more providers would need to be given access to content

and metadata (Monopolkommission, 2021). For reasons of backward compatibility, interoperability could therefore lead to a situation where the lowest common denominator is achieved in all these areas and the level of data protection and security in the market as a whole is reduced to that provided by the weakest provider (Monopolkommission, 2021; Bundesnetzagentur, 2021; Bundeskartellamt, 2021; Wiewiorra et al., 2022). There is also a risk that providers of large and dominant services will gain access to data from users who do not use their service directly (Bundesnetzagentur, 2021). However, this could be specifically prevented by prohibiting the aggregation of personal data from different sources pursuant to Art. 5, para. 2, lit. b DMA (Wiewiorra et al., 2022). Accordingly, gatekeepers are prohibited to "combine personal data from the relevant core platform service with personal data from any further core platform services or from any other services provided by the gatekeeper or with personal data from third-party services ", unless the user has been given the specific choice and has consented (DMA, Art. 5, para. 2).

In addition, some providers of communication services also express concerns to the Bundeskartellamt regarding fundamental security aspects associated with interoperability, such as the possibility of preventing or restricting spam and fraud. Secure systems would be opened up to providers who take data security less seriously. The more services and providers of communication services are integrated into communication, the more points of attack there are for spying on this data (Bundeskartellamt, 2021).

The actual consequences of the DMA's interoperability obligation depend, on the one hand, on its technical implementation and, on the other, on its adoption by consumers. The latter point is analysed in more detail in the following section. The results of the survey on the demand for interoperability and a consumer-friendly implementation option are presented. This is followed by a presentation of the possible effects on consumer usage patterns.

5 Adoption and impact of interoperability

The relevant part of the questionnaire dealing with the implementation of the interoperability obligation and its consequences was preceded by an explanation of the topic in order to familiarise participants in the online consumer survey with the complexity of the issue. The information provided to the NI-ICS users surveyed is shown in Figure 5-1. It was kept very general and did not explicitly address the asymmetric regime foreseen in the DMA. The intention was to find out what consumers think about interoperable NI-ICS in general, regardless of which services are (required to be) interoperable in the future. This is relevant because, in the long term, other or different companies may also be considered gatekeepers and their NI-ICS might be designated as core platform services, and it is uncertain which alternative NI-ICS providers will choose to request interoperability from gatekeepers.

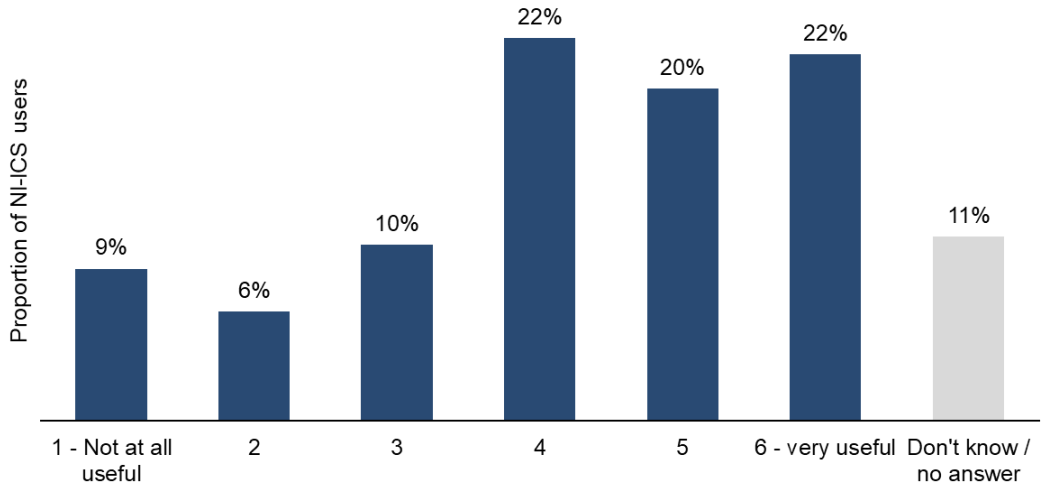
Figure 5-1: Explanation of interoperability provided in the questionnaire

> At the moment, you can only use online communication services such as WhatsApp, Signal, Threema or Slack to communicate with contacts who are also using the same service.
>
> In the future, regardless of which online communication service you and your contact use, you may be able to communicate. Please note that the services will also share the information needed to send the communication in this type of cross-service communication.
>
> For example, you could send a message via WhatsApp that appears on Signal for your contact who doesn't use WhatsApp, or you could start a phone call on Slack that your contact who doesn't use Slack can answer via Threema. You can think of this as being similar to mobile telephony and e-mail, where you can reach your contacts regardless of their service provider - you can email from GMX to Gmail, or call from Vodafone to Telekom.
>
> If you can communicate with your contacts across different services, then the services are "interoperable" with each other.

Source: Own illustration. Translated from German.

Most NI-ICS users consider interoperability to be useful based on the information they have received (64%). However, only 69% could correctly answer a question testing their understanding of the practical consequences of their interoperability decision. These observations have not been omitted from the subsequent analyses, as an informed understanding of interoperability is not a prerequisite for a consumer to engage in interoperability under the DMA.

Figure 5-2: Perceived usefulness on interoperability



Source: Own illustration. Basis: NI-ICS users, N=2,650.

5.1 Configuring interoperability – opt-in vs. opt-out

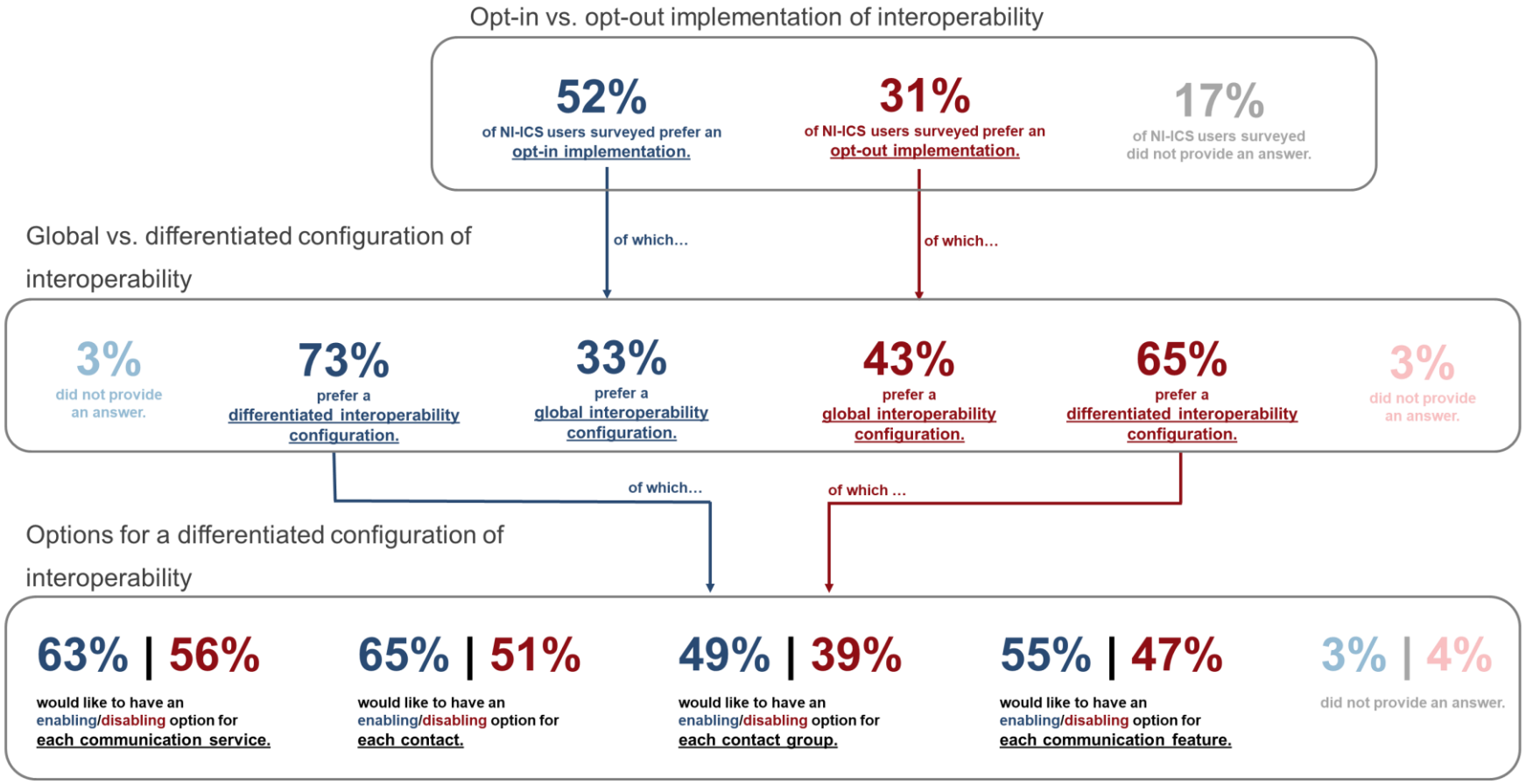
The DMA stipulates, among other things, that the consumer should be free to decide whether or not to opt for using NI-ICS in an interoperable manner. Theoretically, this means that the relevant NI-ICS must have settings to enable or disable communication between services. There are two broad approaches to enabling interoperability in NI ICS configurations:

1. Interoperability is disabled by default, with the option to enable it (**opt-in implementation**) or
2. Interoperability is enabled by default, with the option to disable it (**opt-out implementation**).

Another question is how detailed the enable/disable options should be. Is it sufficient for users to have a somewhat "global/universial" configuration option that, when enabled, allows interoperable use for all available functions, NI-ICS and contacts, or do consumers prefer to have several configuration options to make differentiated decisions regarding cross-service communication, and if so, which types of options are relevant to them?

The survey results show that the majority of NI-ICS users surveyed prefer an opt-in implementation (52%) over an opt-out implementation (31%). In addition, users generally prefer differentiated configuration options for interoperability.

Figure 5-3: Configuration options for interoperability



Source: Own illustration. Basis: NI-ICS users, N=2,650. Multiple answers were permitted.

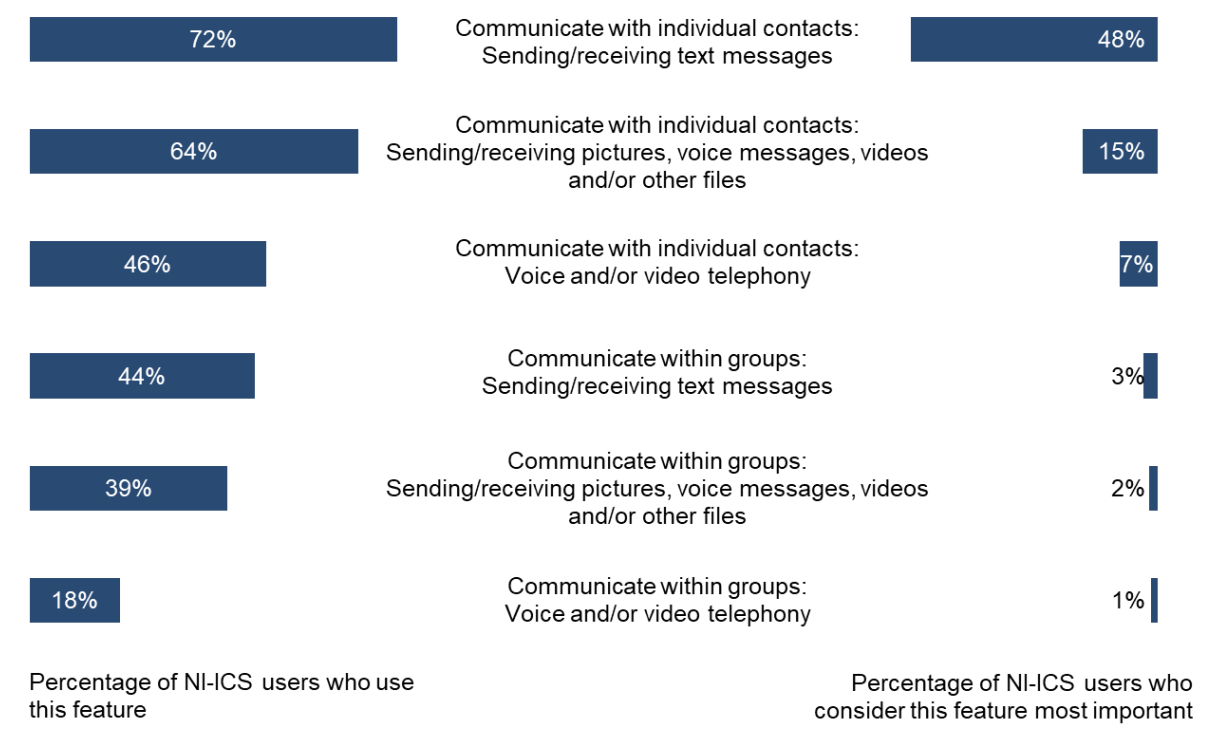
5.2 User adoption of interoperability for NI-ICS

5.2.1 Relevance of features

As discussed in Chapter 4 the DMA states that interoperability will be implemented in three stages. The first stage of implementation will focus on enabling the cross-service exchange of text messages, images, voice messages, videos and other attached files as part of an end-to-end communication between two individual end-users. In the second stage, the cross-service exchange of these media will also be implemented within groups. In the third and, for the time being, final stage of implementation of the interoperability obligation, cross-service voice and video telephony will also be enabled as part of end-to-end communications between two individual end-users and within groups. The features and modes of communication used have been described in Chapter 3.3 and it is clear that these features are essential for users. The staggered implementation of interoperability for these features largely follows the perceived importance of these features to users (see Figure 5-4).

This study also considers a hypothetical scenario in which not only the functions addressed in the DMA are interoperable, but all functions offered by NI-ICS (Level H). This hypothetical scenario provides the means to assess the potential limit of interoperability adoption.

Figure 5-4: Usage and relevance of essential features/basic functionalities



Source: Own illustration. Basis: NI-ICS users, N=2,650. Multiple answers were permitted.

5.2.2 Effect of increasing level of interoperability

The reported level of adoption of interoperability by consumers across the different stages of implementation is shown in Figure *5-5*. In the first stage of implementation, the majority of NI-ICS users surveyed indicate that they would enable interoperability (67%).

Enabling interoperability allows users to initiate cross-service communication via NI-ICS themselves, or at least to be reachable by contacts via another interoperable service. However, most of these NI-ICS users do not support universal or global authorisation. They would only allow the exchange of text messages, pictures, voice messages, videos and other attached files between services on a case-by-case basis – whether for specific contacts, services or only for some of these features (74%). In contrast, a total of 16% of NI-ICS users surveyed report they would not authorise interoperability.

Considering the subsequent stages of implementation of interoperability, it appears that as the level of interoperability increases (i.e. as more functions are made interoperable), the proportion of respondents willing to adopt interoperability decreases. In stage 2, the proportion of NI-ICS users willing to adopt interoperability is 60% (-7%-points), in stage 3 it falls to 58% (-9%-points) and in the hypothetical scenario of full interoperability it falls further to 53% (-14%-points). Again, in the second, third and hypothetical phases, most NI-ICS users consider enabling interoperability only on a case-by-case basis (72-75%). In the hypothetical scenario, about a quarter of NI-ICS users explicitly rule out the adoption of interoperability.

Among those in favour of an opt-in or opt-out implementation, there is an equal proportion of NI-ICS users who would at least partially enable interoperability – although those in favour of an opt-in implementation are more likely to enable interoperability on an individual case basis. In contrast, a slightly larger proportion of those in favour of an opt-out implementation are more likely to allow cross-service communication overall.[11]

However, Figure 5-10 also illustrates that respondents can change their decision to adopt or not adopt interoperability stage by stage. The questionnaire was designed to allow respondents to revise their decision at the subsequent stage. This means that, as in reality, consumers have the opportunity to re-evaluate whether they want to enable interoperability at each stage. For example, a consumer might not enable interoperability in the early stages, become interested in interoperability in the third stage, and then decide against it in the hypothetical scenario because the number of interoperable features might simply be too demanding for the consumer. Figure 5-6 therefore aggregates the decisions for or against interoperability across stages 1 to 3 (or H). It shows that 49% of NI-ICS users intend to adopt interoperability in all three stages. In our hypothetical scenario covering full interoperability, this figure drops to 42%. In contrast, 11% (or 10%) would reject interoperability in all 3 (or 4) stages.

In addition, two other relevant groups of respondents can be distinguished. NI-ICS users who initially would like to adopt interoperability, but as the interoperability level increases, they would reject it, and NI-ICS users who initially refuse to adopt interoperability, but at a later stage, as the level of interoperability increases, they would like to adopt it. A comparison shows that the latter group is comparatively

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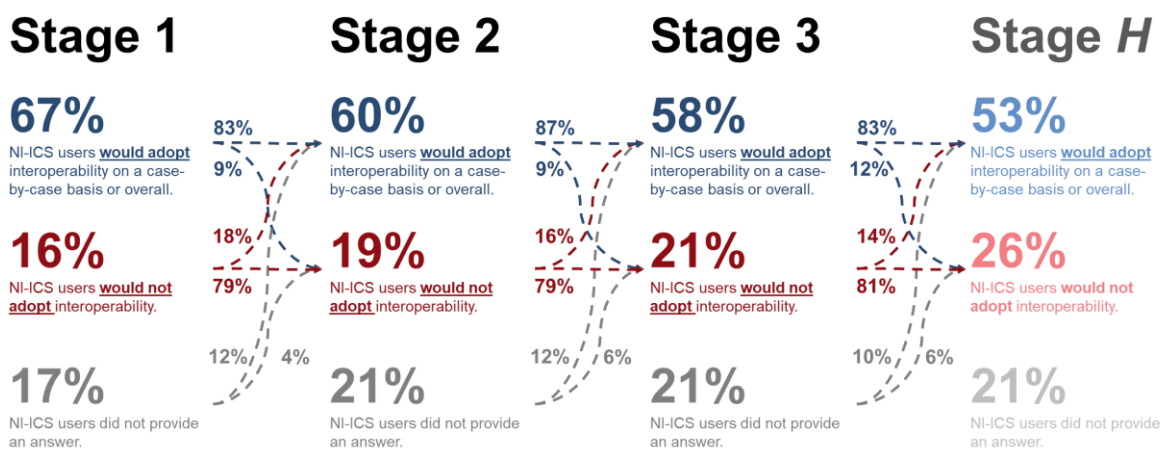
11 In each stage, around 13-17% of those in favour of an opt-in implementation (N=1,387) indicated that they would enable cross-service communication altogether. However, 42-58% of these NI-ICS users indicate that they would only consider enabling it on a case-by-case basis. The supporters of an opt-out implementation (N=820), on the other hand, indicate that 22-26% of them would fully activate cross-service communication in each of the stages considered. However, 41-45% of these NI-ICS users indicated that they would only consider enabling it in specific cases.

small at 3%, while the proportion of NI-ICS users turning away from interoperability as the level of interoperability increases is 8% (or 12%) in all 3 (or 4) stages.

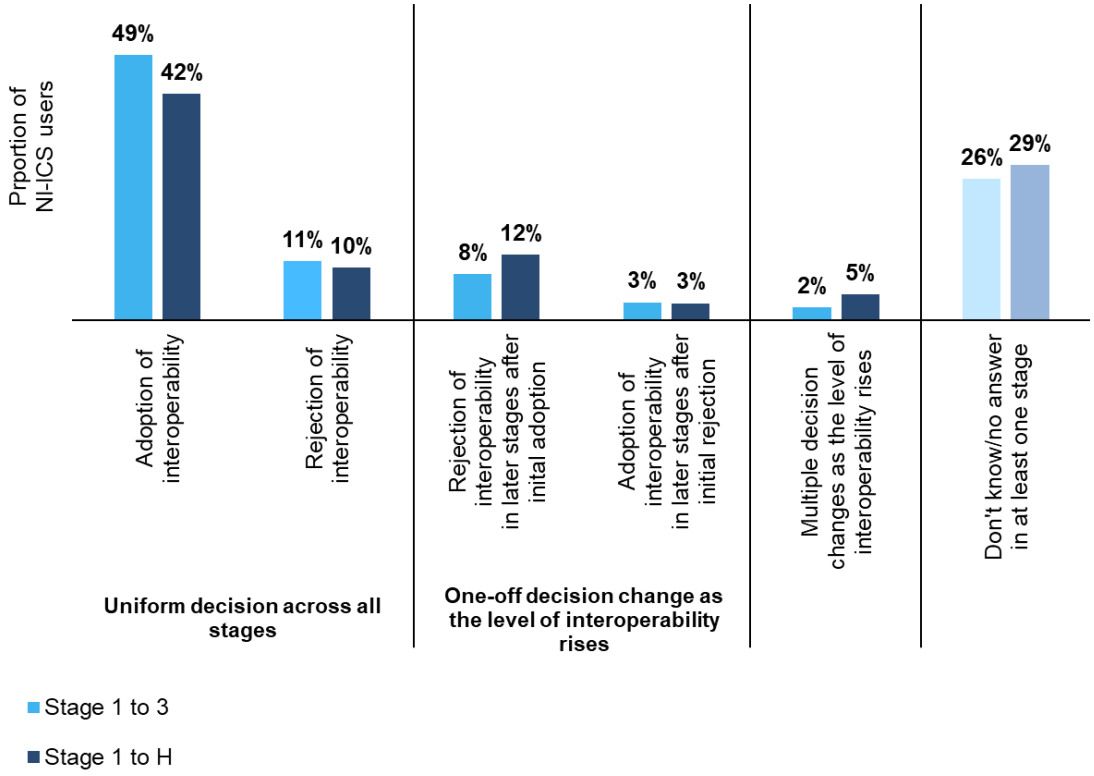
Figure 5-5: Adoption of interoperability across different stages of implementation



Source: Own illustration. Basis: NI-ICS users, N=2,650.

Only 2% (or 5%) change their decision several times across all 3 (or 4) stages. However, 26% (or 29%) of NI-ICS users do not make a statement in at least one stage, so no clear pattern of behaviour or consistent preferences can be inferred for this group.

Figure 5-6: Authorisation of cross-service communication/interoperability across all stages



Source: Own illustration. Basis: NI-ICS users, N=2,650.

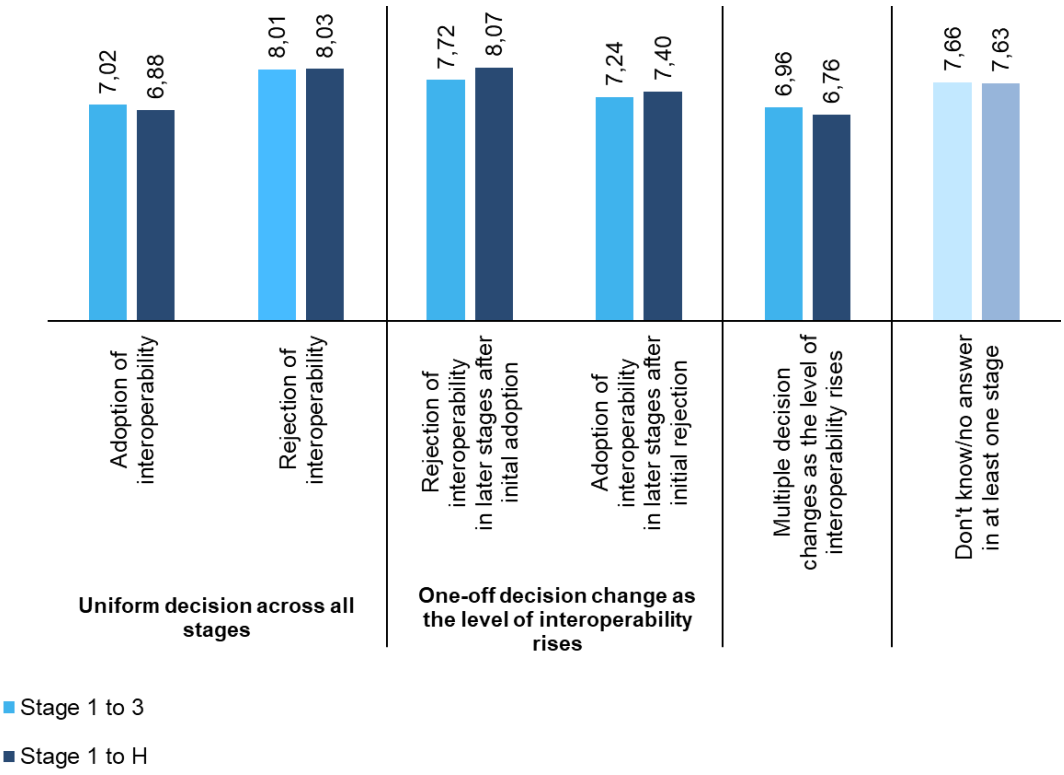
5.2.3 Concerns regarding data protection and privacy

NI-ICS users differ significantly in their concerns about data protection and privacy in cross-service communication or interoperability. For example, NI-ICS users who enable interoperability at all stages, or decide to enable interoperability at a later stage, have comparatively fewer concerns than NI-ICS users who do not enable interoperability at all or decide not to enable interoperability at any later stage.

Concerns were measured based on the level of agreement to four items or statements. Respondents were asked to indicate the extent to which they believed that cross-service communication could lead to (1) loss of control over the protection of their data, (2) loss of privacy because the data could be used unknowingly, (3) the other service taking control of their information, and (4) their privacy being compromised because the other service could use their data without consent.[12]

12 The items and statements are based on Ostermann et al. (2017).

Figure 5-7: Concerns regarding data protection and lack of privacy in cross-service communication / interoperability (rating on a scale of 1-10)



Source: Own illustration. Basis: NI-ICS users, N=59-1,298 depending on the respective categories. The degree of agreement was determined on a scale from 1 [strongly disagree] to 6 [strongly agree]. The mean value of agreement with the four statements was standardised on a scale of 0-10.

5.3 Development of the use of NI-ICS under interoperability

About 97% of the NI-ICS users surveyed in Germany currently use a (potential) core platform service NI-ICS (NI-ICS^{CPS}) provided by a gatekeeper. WhatsApp alone is currently used by around 93% of NI-ICS users and is usually accessed on a daily basis. In contrast, only 50% of NI-ICS users use an alternative NI-ICS. The proportion of NI-IC users who only use alternative NI-ICS is 1%. In addition, alternative NI-ICS are used less frequently and currently play a minor role in the interpersonal communication of their users.

Table 5-1: Breakdown of gatekeeper NI-ICS users and alternative NI-ICS users (basis: NI-ICS users)

Users of gatekeeper NI-ICS	User of gatekeeper NI-ICS designated as core platform services	User of alternative NI-ICS
99%	97%	50%

Source: Own illustration. Basis: NI-ICS users, N=2,650.

As demonstrated in Chapter 4 the availability of interoperability can certainly have an impact on which services are used in the future - especially by those who are willing to enable interoperability and

therefore potentially use it. The latter represent the group of people who are interested in interoperability and can actually take advantage of the benefits and services that interoperability offers.

Users of NI-ICS that would enable interoperability were asked to assess their future use of NI-ICS^{CPS} and alternative NI-ICS (i.e. Threema, Signal, etc.). As it was not conclusively determined by the time the survey was conducted which gatekeeper NI-ICS would be designated as core platform services, data was collected on all potential gatekeeper NI-ICS^{CPS}.

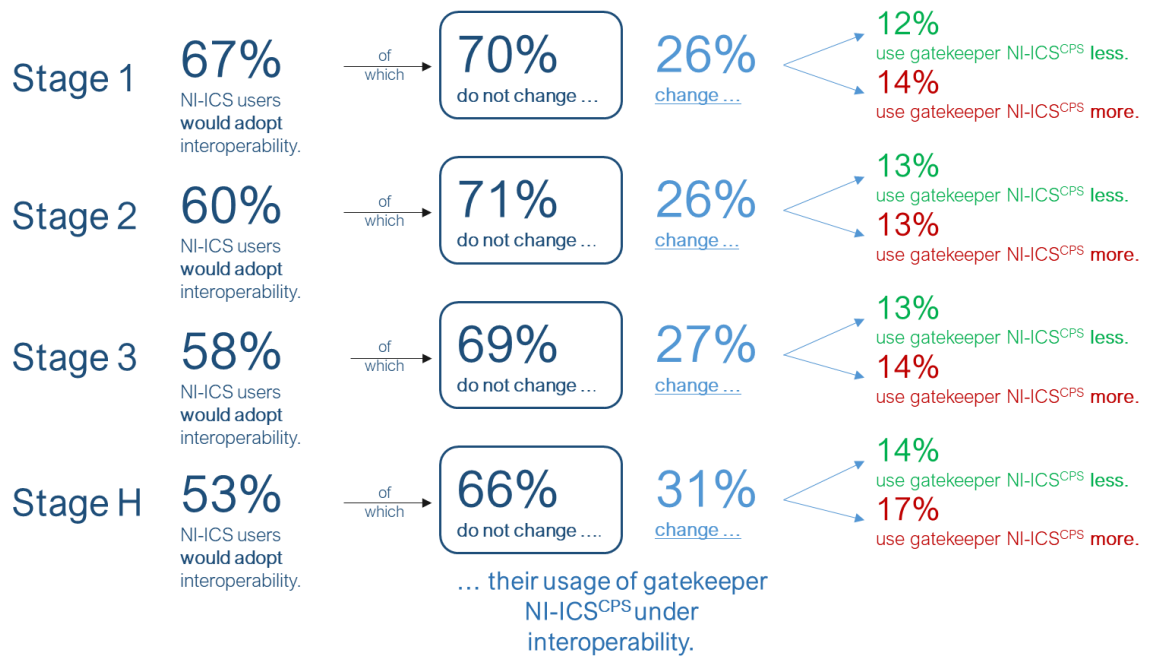
5.3.1 Use of gatekeeper NI-ICS and alternative NI-ICS

Figure 5-8 illustrates how NI-ICS users likely to adopt interoperability reported their future intentions to use gatekeeper NI-ICS^{CPS} at each stage. Overall, the results indicate that the majority of these NI-ICS users expect to continue to use gatekeeper NI-ICS^{CPS} to the same extent as before (66-70%). Consequently, the majority would not change their behaviour regarding the use of WhatsApp, iMessage and Facebook Messenger if interoperability were allowed. This applies to all four stages considered. Depending on the stage, 26 to 31% of NI-ICS users who intend to adopt interoperability indicate a change in behaviour. Approximately half of these may use the gatekeeper NI-ICS^{CPS} more in the future.

Allowing interoperability might have a comparatively greater impact on the use of alternative NI-ICS. Figure 5-9 depicts the responses of NI-ICS users who intend to enable interoperability regarding their future use of alternative NI-ICS with interoperability in each stage. Slightly more than half of these users lean towards changing their use of alternative NI-ICS (52-54%). This is in stark contrast to the result for gatekeeper NI-ICS^{CPS}. Of the NI-ICS users who would change their usage behaviour, 74-77% would use alternative NI-ICS less than before. In contrast, only 23-26% of these NI-ICS users intend to increase their usage of alternative NI-ICS. It is also noteworthy that in all implementation phases, a larger proportion of the NI-ICS users analysed did not answer the question about the future use of alternative NI-ICS than the question about the future use of the gatekeeper NI-ICS^{CPS}.

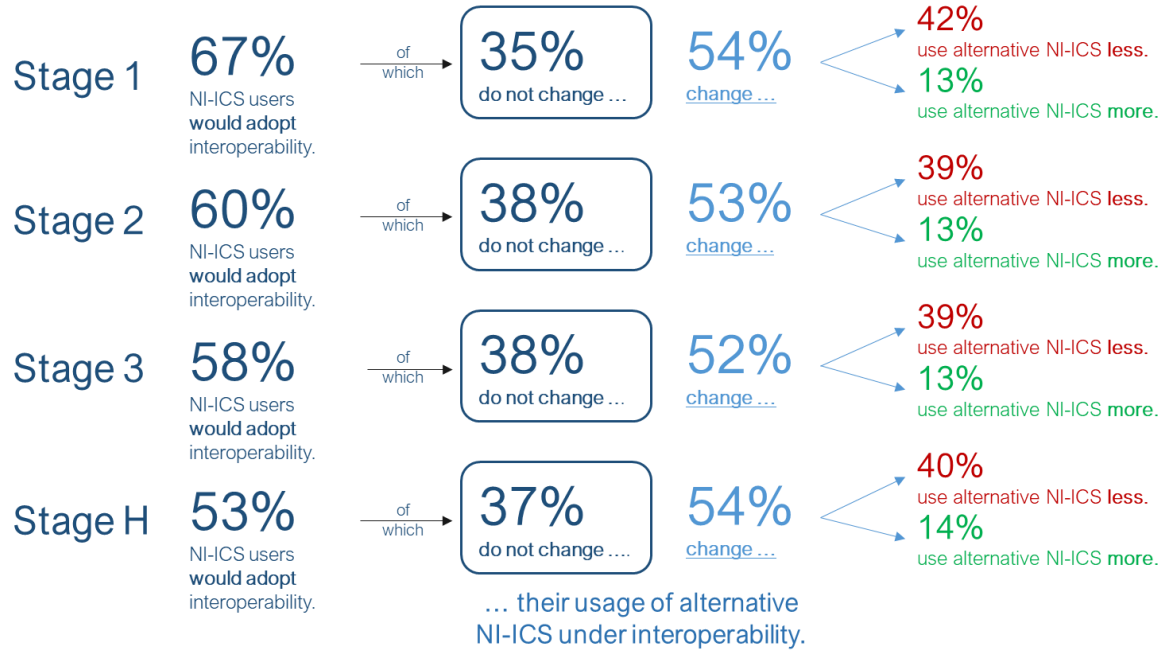
In summary, the implementation of interoperability could result in the use of the popular gatekeeper NI-ICS^{CPS} remaining the same or increasing under interoperability. At the same time, the less popular alternative NI-ICS could be used even less than before interoperability. Of the NI-ICS users surveyed who would change their behaviour, almost three times as many said they would use the alternative NI-ICS less than said they would use it more.

Figure 5-8: Future use of gatekeeper NI-ICS^{CPS} under interoperability



Source: Own illustration. CPS = Core Platform Services WhatsApp, Facebook Messenger, iMessage. Basis: NI-ICS users, N=2,650. The NI-ICS users who would enable interoperability but did not provide any information on future use under interoperability were not visually depicted (3-4% per stage). The category "use gatekeeper NI-ICS^{CPS} less" summarises the responses of those who selected the options "...use less than currently" and "...do not use at all and/or uninstall" in the questionnaire.

Figure 5-9: Future use of alternative NI-ICS under interoperability

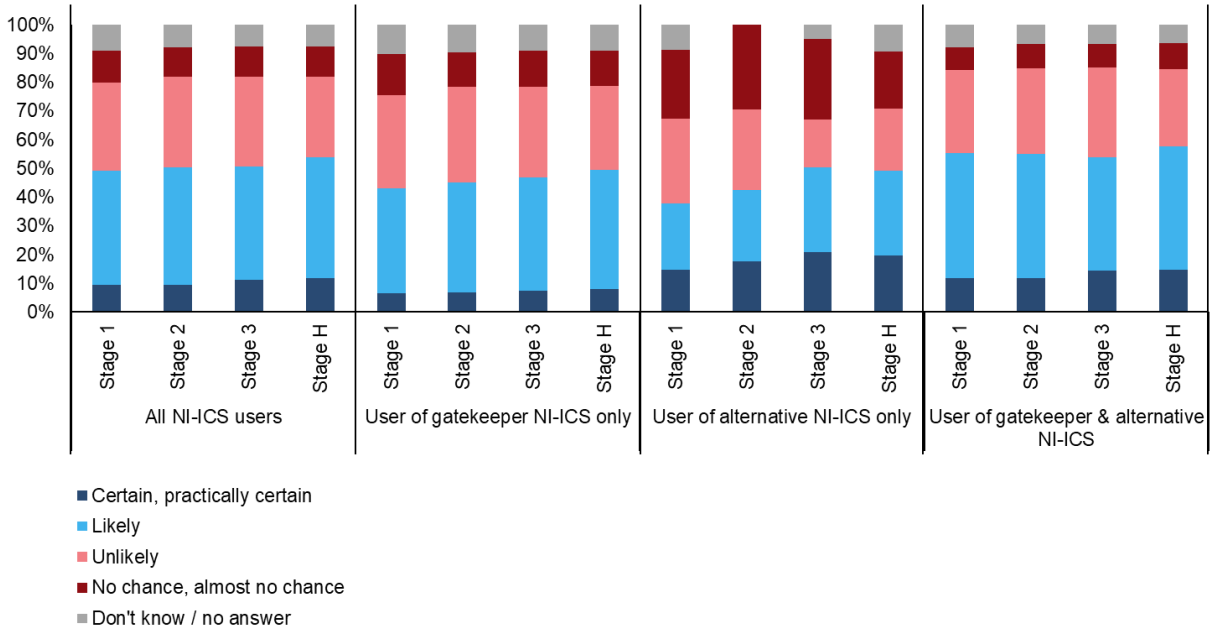


Source: Own illustration. Basis: NI-ICS users, N=2,650. The NI-ICS users who would enable interoperability but did not provide any information on future use under interoperability were not visually depicted (9-10% per stage). The category "use alternative NI-ICS less" summarises the responses of those who selected the options "...use less than currently" and "...do not use at all and/or uninstall" in the questionnaire.

5.3.2 Utilisation of new NI-ICS

The following figure illustrates the likelihood that NI-ICS users would try new services. In each stage, the proportion of NI-ICS users who would enable interoperability is plotted. This proportion decreases from stage to stage, as shown previously. At each implementation stage, slightly more NI-ICS users who would allow interoperability indicate that they would be willing to try new services rather than not.

Figure 5-10: Probability of trying out previously unused NI-ICS



Source: Own illustration. Basis: Respective NI-ICS users who would enable interoperability. All NI-ICS users, Stage 1 to H: N=1,405-1,780; User of gatekeeper NI-ICS only, Stage 1 to H: N=640-854; User of alternative NI-ICS only, Stage 1 to H: N=18-21; User of gatekeeper & alternative NI-ICS, Stage 1 to H: N=745-905

6 Conclusion and implications

E-mail services, WhatsApp and traditional communication services are currently among the most widely used interpersonal communication services by consumers in Germany. They belong to the usual range of communication services that consumers use regularly. Although the average consumer uses other services in parallel, their low frequency of use and their low importance to consumers means that they play a subordinate role. In particular, there is an imbalance in the market for NI-ICS, with WhatsApp being the most widely used with a user share of 88%, followed by Facebook Messenger, a service also belonging to Meta, with a user share of 39%. The remaining NI-ICS analysed in the study only reach user shares of 22% or less.

Interoperability, as outlined in the DMA, could result in a change in the selection and use of NI-ICS in the future. The DMA stipulates that NI-ICS designated as core platform services, which currently include WhatsApp as well as Facebook Messenger, must progressively unlock interoperable functionalities. However, it is up to alternative NI-ICS providers and users to accept this interoperability. For this reason, one of the objectives of this study was to examine the impact and consumer-friendly configuration of the interoperability obligations for NI-ICS, as foreseen in the DMA and to be implemented by the gatekeepers in 2024.

The results of the survey show that the majority of NI-ICS users surveyed favour an opt-in implementation and prefer differentiated configuration options for interoperability. The latter preference was also expressed by the majority of NI-ICS users who favour an opt-out implementation. Relevant configuration options include the ability to set up interoperability for each contact and for each communication service. A consumer-friendly implementation of interoperability should therefore be based on these results and require an opt-in procedure and granular configuration options, at least at per-contact and per-service level. This could tend to increase the adoption of interoperability.

However, the results regarding the adoption and impact of interoperability reveal a disillusioning picture. The analysis shows a negative trend in adoption as the implementation of interoperability progresses. The greater the level of interoperability (i.e. the more functions are made interoperable in later stages), the lower the proportion of NI-ICS users who indicate that they intend to adopt interoperability. In stage 2, 60% (-7%-points) of these users still do so, in stage 3 only 58% (-9%-points), and in our hypothetical scenario of full interoperability, the proportion would even fall to 53% (-14%-points). Most NI-ICS users only consider adopting interoperability on a case-by-case basis (e.g. individual contacts). In the hypothetical scenario of full interoperability, more than a quarter of NI-ICS users explicitly reject the use of interoperability.

Furthermore, it appears that the majority of NI-ICS users who indicate that they intend to adopt interoperability assume that they will continue to use gatekeeper NI-ICS to the same extent as before. In addition, the proportion of NI-ICS users who intend to use these services to a greater extent in the future than before the introduction of interoperability (14-17%) slightly outweighs the proportion of users who intend to reduce the use of these services in the future (12-14%).

However, the impact of interoperability on the use of alternative NI-ICSs may be more of an issue. Despite multihoming, most alternative NI-ICSs are already of secondary use and relevance to the consumers surveyed. In the case of interoperability, the proportion of NI-ICS users who say they will use alternative NI-ICS less in the future than before the introduction of interoperability (39-42%) is around three times higher than the proportion of users who intend to increase their use of these services

(13-14%). Interoperability could therefore lead to a reduction in the use of alternative NI-ICS by those NI-ICS users who adopt interoperability.

This study does not consider the behaviour of NI-ICS users who refuse to adopt interoperability. However, it is unlikely that the mere presence of interoperability has a direct impact on the usage behaviour of this group, as they are not affected by the direct advantages and disadvantages of interoperability.

According to the DMA, providers of alternative NI-ICS are free to request or accept a reference offer from a gatekeeper. Taking into account the expected migration of users and the reduced attractiveness of multihoming, it is highly questionable whether there will be many providers of alternative NI-ICS on the market who will show interest in becoming interoperable with gatekeeper services. There is therefore a risk that even a consumer-friendly implementation of an interoperability obligation for NI-ICS could de facto evolve into a regulatory solution with little interest from already established alternative providers.

The results of the study suggest that the interoperability obligation in the DMA, regardless of how it is actually implemented, may tend to have the opposite effect on those affected than that originally intended by the obligation. At best, it can be assumed that the behaviour of those wishing to adopt interoperability will not change significantly. In addition, interoperability weakens a driver for the use of alternative NI-ICS and multihoming and may therefore contribute to the strengthening of dominant gatekeeper services.

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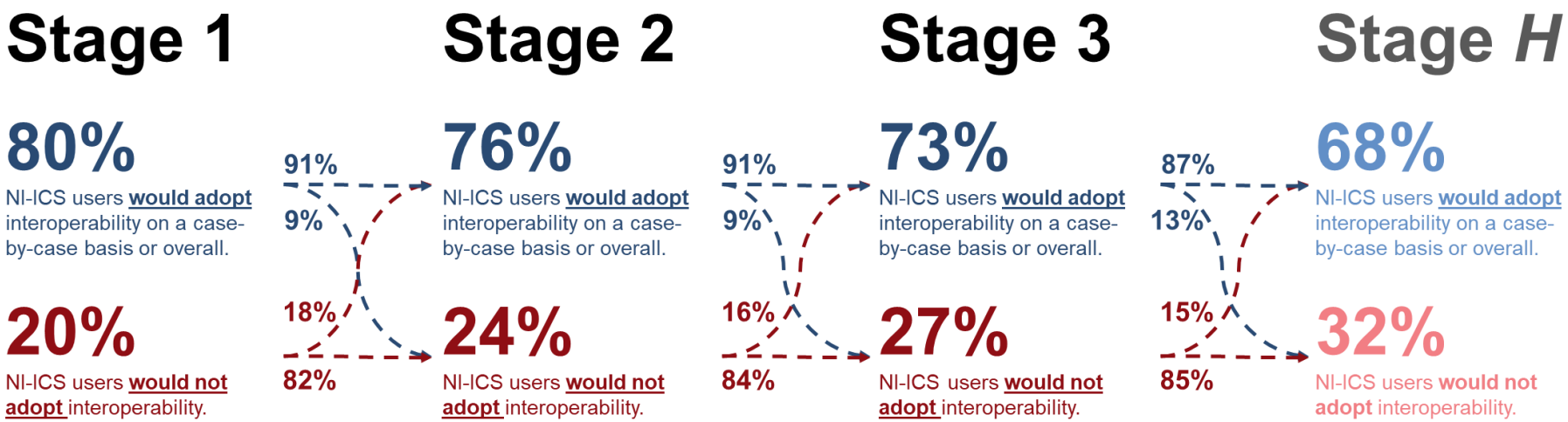
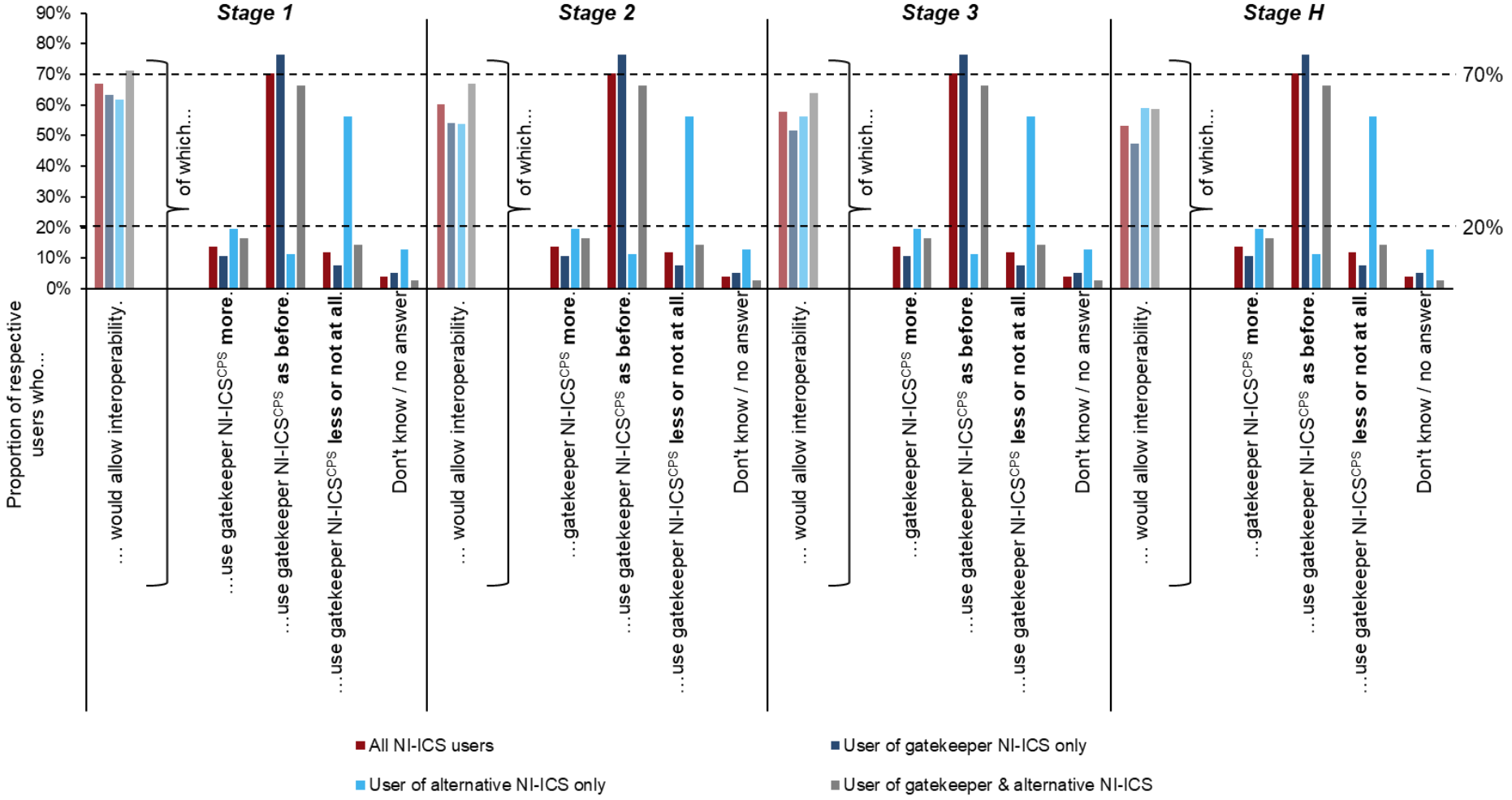
Appendix - additional analyses

Figure A-1: Adoption of interoperability across each stage of implementation – Without NI-ICS users who did not provide any information in at least one stage



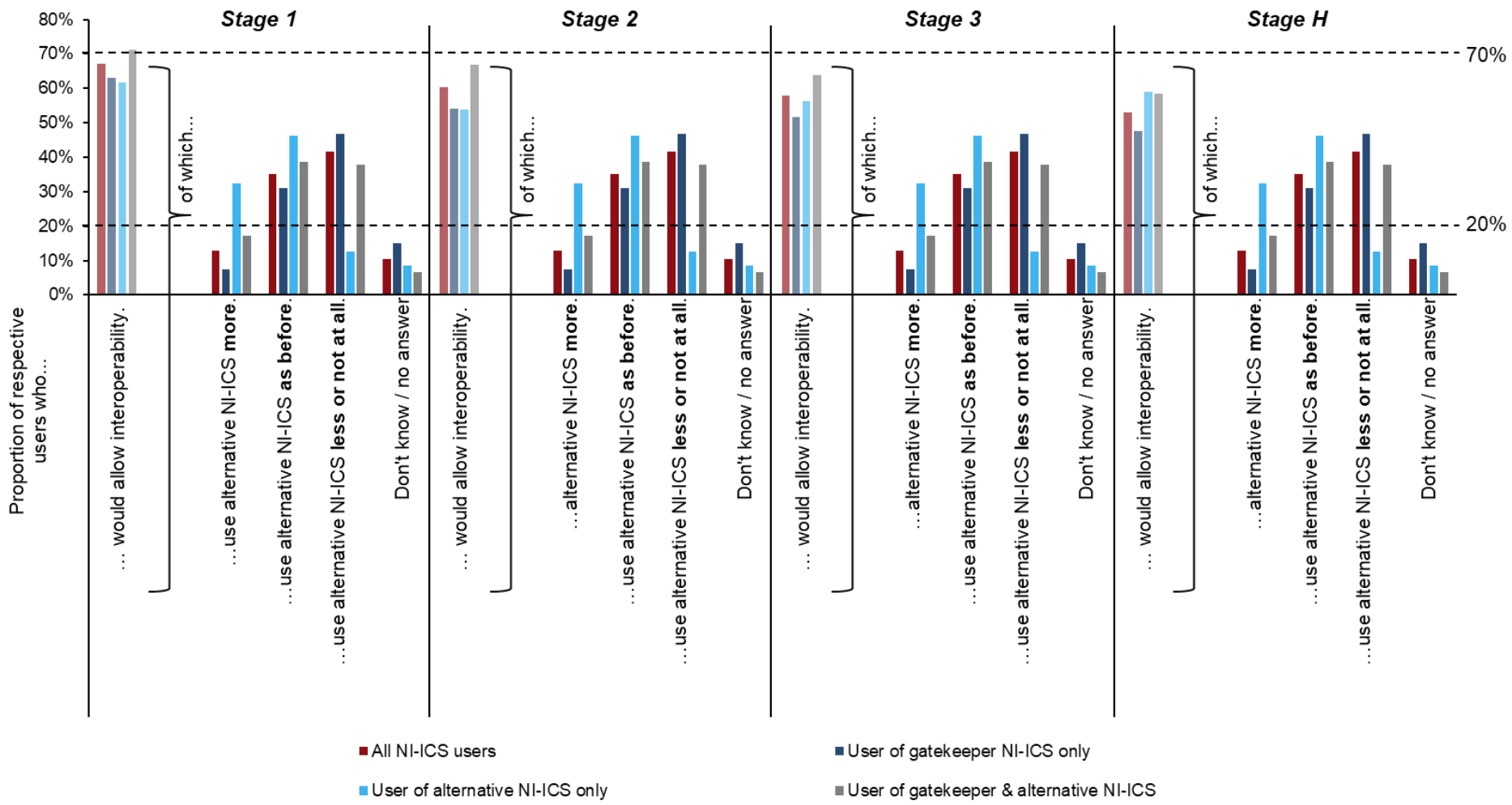
Source: Own illustration. Basis: NI-ICS users that provided an answer in all stages, N=1,893

Figure A-2: Future use of gatekeeper NI-ICS^{CPS} under interoperability - by user group



Source: Own illustration. Basis: NI-ICS users, N=2,650.

Figure A-3: Future use of alternative NI-ICS under interoperability - by user group



Source: Own illustration. Basis: NI-ICS users, N=2,650.