

Article

Digital Networking in Home-Based Support of Older Adults in Rural Areas: Requirements for Digital Solutions

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Abstract: Given the increasing numbers of elders in need of support living at home, digital solutions are developed to ensure good home-based care and support. From a perspective of qualitative urban sociology, the presented study aims to provide an overview of existing technologies for communication as well as networking social support for older adults especially in rural areas, as well as requirements for their dissemination. The focus is on digital networking via apps and platforms in Germany that provide digital support in the areas of participation/communication, mutual aid and/or professional services for older adults. For this purpose, interviews with representatives of 12 projects as well as workshops were conducted. Support mediated via the digital solutions was not always accepted as expected, not even during the COVID-19 pandemic. To ensure a sustainable and long-term use of the digital solutions, it is necessary to take into account the digital skills of the users, to deploy a supervisor and local networker, to find a suitable spatial dimension, to create an awareness of existing problems on site and to anchor the support in suitable structures.

Keywords: rural areas; aging at home; digital networking; older adults; collaboration; voluntary support; neighborhood; Germany



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1. Introduction

Most older adults in Germany want to live as long as possible in their familiar surroundings. They would like to remain in their own households, independent and self-determined, even if they become in need of help or care [1]. Relocations in advanced age are usually only made when there is no other option [2]. Accordingly, only a small proportion of the elderly live in retirement homes or nursing homes [3]. Germany is considered a “conservative” country, according to the welfare typology of Esping-Anderson (1990) [3], despite some liberalization efforts since the late 1990s [4]. As such, the primary welfare responsibility lies on family members, supported by professional caregivers for medical and daily care, giving the state a subsidiary role. Hence, around three-quarters of those in need of care are cared for at home—by relatives or professional caregivers [5].

The healthcare system in Germany is well positioned in an international comparison [6]. However, in view of the rising proportion of over-65s in the total population as a result of demographic change (22% in 2019 [7]), and an increasing shortage of skilled nursing professionals [8], new ways have to be found to ensure good home-based care and especially support for older adults. This applies in particular to less densely populated rural regions.

The need for support usually increases with age, and family caregivers and supporters are often unable to cope with this on their own. Therefore, the support of other volunteers and professional caregivers is often necessary.

Formal volunteering, explicitly in the neighborhood unit, is not widespread in Germany, even though a large number of neighborhood associations have been founded in recent years [9]. It is often assumed that neighborhoods in rural areas in Germany are livelier and show more solidarity than urban ones, but there is insufficient empirical evidence

for this. Nevertheless, professional and institutional support is often inadequate in villages or more difficult to access. So more people in rural areas are dependent on help from neighbors than in urban areas and rely on traditional or informal forms of support [10].

Collaboration of the involved actors often proves to be a challenge [11]. Digital solutions can offer the possibility to help the different parties involved to better collaborate with each other. In recent years, numerous profitmaking and nonprofit Internet platforms and applications (apps) have been developed with the goal of supporting mutual aid or supporting the organization and networking of volunteer and professional help.

The German government assumes that the increased use of digital technologies can enable independent living in one's own home, even in cases of impaired health and need for care, and can also maintain social participation [12]. This includes technologies in the care sector such as smart health monitors, smart home systems and household robots, but also digital solutions for individual communication, such as social networks. So far, however, little is known about which digital solutions are being used to connect different individuals and organizations and promote support in care, especially since many of these digital solutions appear to be isolated solutions or are only being used as part of research projects (see Section 2). This is a fairly new field, in which evaluations and critical analyses of the use of digital solutions to support the networking of home-based care and support of older adults in rural areas still seem to be a rarity.

There are a number of studies that analyze apps for informal caregivers of people with dementia, for example. However, their primary focus is often on supporting family members with information, services and reassurance, e.g., to provide emotional or social support to prevent depression or to improve the well-being of informal caregivers [13–16]. The objective of communication between informal and professional caregivers regarding shared care, if any, does not seem to be in focus. Thomas [17] gave an overview on different digital technology solutions to support caregivers available on the Scottish and UK market that includes several software platforms and care apps. This is also in part the objective of the present study, but Thomas limited her study to a listing without addressing experiences. Furthermore, research on technologies as support for caregivers especially located in rural areas are rather the exception [18], which may also be due to the fact that digital social innovations seem to be concentrated primarily in urban areas or have no spatial focus [19].

Studies known to us that have looked at or compared different approaches of social networks on neighborhood level, each cover only a section of the field, such as digital (networking) solutions from the perspective of rural municipalities [20] or the conceptually and empirically validated design parameters of neighborhood social networks [21]. Renyi et al. [22] developed a maturity model aimed at standardizing the monitoring and evaluation of Information and Communication Technology (ICT)-supported neighborhood projects (caring communities), which can be used as a guide and to monitor and evaluate neighborhood development projects. A consistent but broad study about digitalization in rural areas, which also analyzes the roles and motivations of driving actors, was published by Sept [19]. She focuses on the investigation bias, which leads to surveys of either social innovation or technical innovation in rural areas. There are also studies concerning the general effects of digital media in neighborhoods, such as Becker et al. [23]. The authors looked at how neighborhood platforms and social media influence contemporary neighborhood practices, especially regarding communication and neighborhood help. Here again, the spatial dimension of urban areas was considered, and the elderly were not specifically taken into account.

The aim of the study is to provide an overview of existing digital solutions for networking social support and care for older adults and to investigate what experiences have been made with them so far, in order to promote their dissemination and the development of new approaches. The result of the study is a catalog that shows the requirements for digital networking solutions that can be used by municipalities and other stakeholders in this field. For this purpose, we evaluated various existing software products and platforms in German-speaking countries, but with a focus on rural areas. We looked at solutions in

home-based private households as well as, for example, in supervised flat-sharing communities, but not at inpatient care. Medical care was also not considered, but daily care and other home-based support were. As the evaluation of the study took part during the first German lockdown of the COVID-19 pandemic (March 2020), we also included, as an extension of the research, questions on the impact of the lockdown policies on the use of digital solutions.

In this article, we will discuss selected results of the study with a focus on technology, involved individuals and organizations, spatial dimension, and voluntary help in the context of transferability and thus sustainable digital networking, so that older adults, especially in rural areas, can be supported and cared for in the home environment. Digitally mediated neighborhood assistance is considered here in particular. Which requirements must be met so that a digital solution in this area can function sustainably and have a lasting effect?

The results showed that for digitally assisted support of older adults living at home and to ensure a longer-term use of the digital solutions, it is necessary, among other things, to take into account the digital skills of the users, especially the older adults in need as well as the volunteers. At least one person in the function as supervisor, multiplier and local networker on site is needed to support the success and dissemination of the digital solution. In addition, it is also necessary to find a suitable spatial dimension, to create an awareness of existing (general and specific) problems on site and to anchor the support in suitable structures.

2. Materials and Methods

For this study, we chose a qualitative research approach to show insight and experience of different digital solutions. The focus of our study (August 2019 to June 2020) was on solutions for digital support in the previously defined areas of (1) participation/communication, (2) mutual aid and/or (3) professional services (also) for older adults. For this purpose, we conducted an Internet research and document analysis of existing software products and platforms in German-speaking countries. Since an entire collection and quantitative evaluation was not the aim of the study, the research was not systematic. To be included in the study, the digital solutions had to aim at communication and/or networking of those needing support and of formal and informal helpers; address older adults in home-based living settings as a (sub-)target group; and be on the market or in an advanced stage of practical use of a research project. In order to narrow down the field, (tele)medical solutions (e.g., communication between patients and doctors), those aimed exclusively at professional healthcare workers (such as communication between nursing staff and doctors), and basic communication technologies without further features (e.g., text messengers) were not included. A total of 26 digital solutions that we identified met the above criteria. Of these, the following analysis was based on a selection of solutions that were as diverse as possible, and the aim was to evenly cover the three areas mentioned above. Projects with a focus on rural areas were selected preferentially. Based on the qualitative research approach, to gain deeper insights from the use of the digital solutions, and also because of the design of the approach as a brief study, a total of 12 solutions were selected for further analysis. The aim of the study was not to quantitatively determine and compare the experiences of digital solutions, but to focus on individual conditions for success and both positive and negative experiences in the development and use of different digital solutions. In this article, we discuss the results in the context of requirements for long-term and thus sustainable networking via the use of digital solutions.

We conducted semi-structured face-to-face and telephone interviews with 12 companies or (research) projects (referred to below as “projects”). The main target groups of our interview partners were project managers and local project coordinators who could provide a comprehensive insight into experiences with the digital solution and possible hurdles in its dissemination. If they were not involved in the technical development themselves, we included interviews with developers. In some cases, specific users, who at the same time

had a special role in the project, were named in response to our inquiry by the project managers. These were the head of the care service involved in one project, a care advisor and a member of the senior citizens' organization. We conducted additional interviews with them to include their insights. Interviews were conducted with up to five representatives of each project (Table 1). The 17 interviews with 22 people were recorded and fully transcribed. Ten categories were defined for the analysis, namely: goal, target group, area of application, features, technology, participants/users/coordinators, owners/providers, business model/financing, experiences/benefits, and future development/planning/transferability (especially in rural areas). We analyzed the transcribed interviews deductively, based on the categories, and prepared the results of the interviews in the form of profiles including an interview report.

Table 1. Overview of the evaluated projects.

Project	Description	Goals	Interviewees
A	Communication and documentation system in residential care communities	Support for exchange between relatives and professional caregivers; transparent management of appointments and documentation of care services	manager; developer; user
B	ERP system and app for organizing neighborhood help for people in need of care	Real-life social network to support people in need of care and family caregivers through trained volunteers	manager
C	Communication app with options for official (village) news and municipal websites	Strengthening regional and local social networks through information and communication	manager; local coordinator
D	Regional online marketplace/local delivery service	Promoting neighborhood support; strengthening local supply and regional producers and suppliers	manager; local coordinator
E	App with information portal/call for help for non-medical emergencies	Local information for elders; relaying of help for acute non-medical emergencies within the neighborhood	manager
F	Neighborhood platform and app with information and communication features and first aid function	Improvement of structures for (pre-)nursing care at neighborhood level; creation of low-threshold communication opportunities; acute help in emergencies	manager
G	Regional social network as meeting space for seniors	Supporting contacts and social interaction in the region; networking and advertising of projects; arranging voluntary help	coordinator; developer; user
H	Ambient Assisted Living System: home emergency call, helplessness detection, observation of ADLs; virtual preventive counseling, and more	Staying longer at home by integrating smart home technology and social services	manager (2), user/coordinator, staff (2)
I	App for the semi-automated coordination of neighborhood help	Support for the coordination of voluntary neighborhood help	developer/user
J	Platform to support the organization of communities	Among others, provision for situations in which helpers are unavailable; networking and communication with volunteers, coordination of neighborhood help	manager; coordinator
K	Neighborhood platform and app with focus on health	Supporting neighborhood interchange, activating citizens and providing access to local (health) service providers; alternative to existing social networks	developer
L	Neighborhood platform for social exchange	Active, social network at neighborhood level	coordinator

All information in this table is taken from the interview transcripts (IP1–IP21).

We then defined requirements for future digital solutions and transferability. For this purpose, we supplemented the results of the deductive evaluation with an inductive analysis of the interview transcripts. We discussed the requirements for digital solutions identified in the study in two virtual workshops with experts from the interviewed projects

(e.g., project managers, developers) and supplemented or revised the requirements in the follow-up.

In the context of the COVID-19 pandemic, we conducted a brief survey of the projects with the aim of finding out to what extent the lockdown or contact restrictions affected the use of the technical solutions. Experts from 10 projects were asked to provide feedback by means of a short questionnaire in mid-April 2020, around four weeks after the introduction of the lockdown in most parts of Germany. Representatives of seven projects answered the questionnaire.

Based on the selection of projects considered, both positive and negative experiences in the development and use of digital solutions to support older people in home-based living settings were highlighted. On this basis, requirements for sustainably effective (future) digital solutions in this field were defined.

Data from the interviews are presented anonymously in this report. The names of the projects studied can be requested from the authors. Contents and quotations from the interviews or workshops are provided with source references from the transcripts (IP1–IP21, W1–W2).

3. Results

The 12 investigated digital solutions included support systems for the procurement of help and assistance (within the neighborhood) (4 of 12), local news and information portals (4), communication and neighborhood platforms (5), a system for the detection of critical situations (1), a digital call for help (2), and a system designed to support communication and documentation in a supervised flat-sharing community (1) (multiple answers possible). Most solutions were utilized by applications that could be used remotely via smartphone and/or a web browser of a computer. Out of the 12 digital solutions, seven were developed within the framework of research and pilot projects.

3.1. Areas of Support

The digital solutions were evaluated with regard to various characteristics and features. The focus was on three areas of support: participation/communication, mutual help and assistance, and professional services, both individually and in combination. Half of the projects covered two areas, and three of them covered all three areas (see Figure 1).

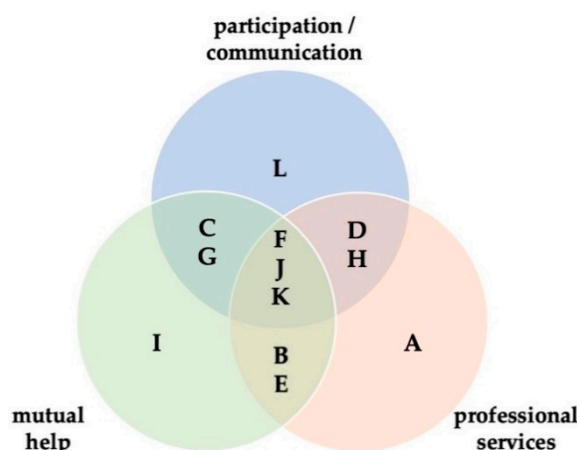


Figure 1. Areas of support of the investigated projects. For the allocation of the letters, see Table 1.

The goal of many of the digital solutions considered here was to digitally connect people in a defined geographical area and to promote communication. The support area of participation and communication (eight out of 12 projects) was mainly covered by features that enabled people to communicate with each other. These included (live) chat features in public or closed groups, and also ways of direct communication (messages) between individuals or selected groups of people, and the writing of public posts. Not only was

digital participation and communication important here. In some projects the promotion of physical contact was an explicit goal.

Professional service providers were involved in some projects, yet their fields of application were different. Some professional caregivers used the digital solution not only to contact relatives and exchange information, but also to document care services, for example. In other projects, care or health advisors took on a kind of “inventory” of new users of the digital solution or of people who wanted to claim assistance or were (additionally) involved in the project as cooperation partners and could be contacted via the platform.

The support area of mutual help and assistance was subject of eight of the 12 projects considered, although it was not actively pursued in all projects. In some cases, inquiries and offers could be entered in general chat forums, bulletin boards or relevant forums. In addition, there was the possibility to use an intermediary, such as a neighborhood help association. In this case, the digital solution was used to maintain lists of helpers and contact profiles and to support in seeking help.

3.2. Technologies and Features

A large proportion of the software used was developed as part of the projects: representatives of 11 of the 12 projects stated that they developed or programmed it themselves, in some cases with the help of third-party software (e.g., frameworks or plug-ins from other providers; open source or purchased/licensed). In-house developments with components from previous projects were often found in research projects (IP21). Completely self-developed projects may have increased time and thus costs, but also offered more variability and precisely fitting features (IP3: 133 et. seq).

Ease of use was particularly important in technical terms during development. Some of the projects developed the technology from the outset, together with people from the target group in an iterative process based on their wishes and needs. The reason given for this development process was that in the past many projects were developed past the users and were not accepted afterwards (IP21: 63).

The design, especially in apps, was based on the main areas of use and target groups. Projects with a focus on help were designed differently than social (neighborhood) networks or projects in professional care. Since older adults would be the users in most projects, digital solutions were designed as simply and intuitively as possible to facilitate access (IP13: 546–559). Fully accessible use, for example, with large font, large click boxes or a read-aloud option, was also useful if the technology was aimed at older adults (IP21: 77–181). Projects whose goal was to strengthen a local social network often worked with a colorful and playful design. Projects that aimed at transmission of information focused on clarity.

Commercial hardware (smartphone, tablet, all-in-one PC) was distributed to users in two projects. In almost all projects, personal data, such as contact data (e.g., e-mail addresses) for identification purposes, were required. Accordingly, data protection played an important role in all projects. Research projects, in particular, had data protection concepts in place to operate in compliance with the EU Data Protection Regulation (EU GDPR). None of the projects used the members’ data to generate profits from it, i.e., data were not sold to other companies.

3.3. Involved Individuals and Parties

A wide range of individuals, groups, institutions or professional groups, and in some cases also research institutions, participated or collaborated in the implementation of the digital solution, programmed it, administered it, moderated it or entered content.

The target group for many digital solutions was older adults. In addition, the targeted users were citizens in general or volunteers as end users. Other main user groups also included relatives of people in need of help, administrative employees, tradespeople, as well as professional caregivers, non-profit associations and companies. Accordingly, some

projects focused on supporting (elderly) people in need of help without them using the digital solutions themselves. Other groups could use the digital solutions or had access to them, for example, to provide information for the target groups (e.g., municipalities, associations, neighborhood management, landlords) or to advertise their businesses on the platforms or to network via them.

Which participants were actively involved in the 12 projects? If we consider only those who used the respective digital solutions themselves, provided information in it, were required for its use or administered it, developed it, offered it or were directly involved in any other way, we find that, in addition to older adults and citizens in general (the largest group in nine projects), followed by volunteers (8) and private or research developers (6 each), we had a wide range. Five projects each involved municipalities or administrations, associations or senior citizens' initiatives, and producers, retailers and (health) service providers. Four projects each involved care advisors, a care support center or health advisors, and relatives. In three projects, companies acted as providers of the tool, and in two projects each, professional caregivers, outpatient care services, research institutes (without development), housing associations and foundations were involved. Occasionally, actors from the senior citizens' advisory council, senior citizens' office (district level), neighborhood management, the home emergency call center, church organizations, landlords and the medical profession could be found in the projects. These figures illustrate the extensive actor networks that digital projects can span to support older people.

The actual user structure was not surveyed in the interviews, partly because the interviewees did not have more detailed information on the users for reasons of data protection. Some of the projects examined here—insofar as private individuals or citizens were part of the user group—were explicitly aimed at older people, although there is rarely a definition of the age at which one is “older.” One project, for example, predominantly addressed people aged 55 and older as users who could receive or offer help via the digital solution, but also encouraged younger people to publish offers of help for the elderly (IP1). It can be assumed that the overall proportion of older users was higher compared to the users of other social media. For example, the D-21 initiative [24] noted that “heavy users” of general social media are between the ages of 14 and 29 (87%). As age increases, usage drops to 29% in the over-65 age group, with use of most social media dropping significantly as early as age 50. In contrast, one project in the area of participation/communication reported an average age of 43 (IP13).

In a large proportion of the projects examined here, the digital solution was introduced (or would be introduced in the case of a later market launch) by a higher-level authority, such as a municipality, quarter management, association or seniors' advisory council, and in one case via an operator of a flat-sharing community. The reason for this is that in these projects there are or should be people on site who enter and continuously update (local) content and data and, if necessary, verify the users when they register and are available to answer questions.

3.4. Spatial Dimension

Although some digital solutions in this study were available across federal states or even throughout Germany, the specific area of application extended to the municipal level in most cases (7), otherwise, to the neighborhood or district level (3), (several) counties (3) and in one case to a single dwelling (flat-sharing community). Only two platforms emphasized two or more spatial key areas, e.g., urban and rural areas (Table 2).

According to one interviewee, a critical mass of users would be needed for the digital solution to become self-sustaining, lively and interesting on its own (IP13: 360–362), i.e., to run without special support from the provider or the municipality. In addition to private individuals, this also included, for example, associations, the local retail trade or other commercial enterprises, if they were integrated into the (financing) concept. This could be achieved more quickly in large cities simply because of the spatial density. What was

defined as a “neighborhood” in a specific case would have to be decided locally and on a street-by-street basis (IP13: 799 et seq.).

Table 2. Area of application and spatial focus of digital solutions.

Project	Area of Application *	Spatial Focus
A	two residential care communities in two cities (< 150,000) (single dwelling)	no spatial focus
B	one city (>1 million) (municipal level)	no spatial focus
C	>35 villages and municipalities across Germany (municipal level)	rural areas
D	one municipality (three others discontinued) (municipal level)	rural areas
E	three counties and three cities (>100,000) (county/municipal level)	rural and urban areas
F	several districts in one city (>250,000)(neighborhood/district level)	urban areas
G	one county (county level)	rural areas
H	one city (>100,000) and two counties (county/municipal level)	rural and urban areas
I	one village (municipal level)	no spatial focus
J	several municipalities across Germany (municipal level)	no spatial focus
K	eleven districts/neighborhoods in one city (>1 million) (neighborhood/district level)	urban areas
L	several hundred neighborhoods across Germany (neighborhood/district level)	urban areas (expansion into rural areas targeted)

* in parentheses: approximate number of inhabitants.

While, for one thing, a minimum number of users would be required, another interviewee mentioned that there would also have to be a spatial and user upper limit. This concerned the growing anonymization of users as well as supervisors and the farther distances that would have to be traveled for support or use of the offered services (IP1: 548–553). Even for a project that envisaged implementation in supervised flat-sharing communities, a transfer to, for example, conventional home-based or inpatient care was considered impractical, as it should involve a manageable group of participants (IP2). Accordingly, the goal is to select the spatial dimension of the digital solution so that it make sense from a financial, organizational and structural perspective. One fundamental obstacle to digital projects, which is particularly prevalent in rural areas in Germany, is the partial lack of broadband and mobile Internet availability (IP17; [25]).

3.5. General Aspects of the Transferability of Digital Solutions

Some projects developed the technical solution for their own use, i.e., under local, specific conditions. Transferability or a business model was not the focus for the time being, even though dissemination was usually desired for the future. The focus was not only on increasing the number of users, but also on dissemination to the broader area, i.e., to other communities or regions (IP15). Technically, all the projects studied here were transferable. However, transfer would have to take into account individual circumstances, e.g., scope or size of application (IP18). In the case of spin-offs from research projects, the question often arose as to the form in which the digital solution could be continued after the end of the project. If it would not be used as an individual stand-alone solution, e.g., in a municipality, but as a platform solution, an operator would be required (IP3). Some platform solutions used a business model in which the provider took over complete or predominant management of the resources (computing capacity, storage, programming,

etc.) and the underlying operating system, including updates (Software as a Service—SaaS). The local provider offers the software applications without having to worry about technical infrastructures.

In addition, the reuse of existing digital solutions made sense from the point of view of saving resources. Development costs could be saved even if parts were reused, as is common in back ends (IP15). There were already some good solutions on the market, in-house developments were not essentially necessary (IP13).

Members of four projects that did not yet have a business model stated that the source code of the digital solution should be available as open-source software if possible. It should be noted, however, that this sometimes would involve considerable programming and further development work to adapt the solution to local conditions and to fill it with data (IP11). Once the initial development was complete, it must be taken into account that the personnel costs for moderation, operation and, if necessary, user training would be higher than the ongoing costs for the maintenance and further development of the digital solution (IP11).

In new projects, it would often not be taken into account that there must be someone responsible for support (e.g., inquiries, forgotten password, etc.) and complaint management. Permanent structures would have to be created for this (IP13), which were conceivable as cooperation models, among others (IP11, IP1). In addition to technical maintenance and support, a carrier would also be needed for the frequently mentioned caretaker function (see Section 3.6.3).

3.6. Digital Procurement of Voluntary (Neighborhood) Help

Digital neighborhood networks offer the possibility for low-threshold local support. To investigate whether and how digital networking is accepted, and which requirements must be met for successful deployment and transferability, we examined various features in our study. These included communication and information functions, use in the (pre)care sector, and formal and informal voluntary (neighborhood) help including acute help in non-medical emergency situations. Since the functioning of the interplay of digital and analog processes, and thus sustainable support, was particularly evident in functioning neighborhood volunteering, this feature is discussed in more detail here.

3.6.1. Experiences with Digitally Supported Neighborhood Assistance

Eight of the 12 projects considered included digital support for mutual or neighborhood assistance. These include visiting or companion services, the sharing of objects (e.g., tools), shopping, delivery or driving services, e.g., by neighbors or other volunteers. Some of the projects studied had search and offer forums for this purpose, through which users could post requests or offers for help. In these cases, the person seeking help or the helper searched for a suitable counterpart or, if necessary, had the system making suggestions and contacting the counterpart. In this case, the individuals acted on their own initiative; in terms of quality management, it was not possible to check whether and how support was provided.

In other projects, the procurement of neighborhood help was carried out via an intermediate, such as a neighborhood help association. This association used the digital solution to maintain lists of helpers and contact profiles, i.e., the digital solution was used here for organizational support without the people seeking help contacting the solution themselves. Those seeking help contacted the association by phone, for example, which then used the digital solution to find helpers or published partially anonymized requests for help only for helpers.

Although requests for help via the digital solutions came regularly (IP14), the absolute number of demands for help through this medium was not as high as expected. The reason for this was seen in a reluctance to seek help from strangers and social barriers (IP1). In one research project, the approach of complementing volunteer engagement with a professional care service was offered. However, this could not be followed up because help on such a

large scale was never requested (IP3: 322–326). Another project also reported that the offers of help mediated via the digital solution were “fortunately still relatively little” accepted. This was attributed to the fact that there was still a functioning “analog” neighborhood that provided support. Driving services were the most likely to be used (IP7: 153).

3.6.2. Influences of COVID-19 Policies in the Digital Mediation of (Neighborhood) Help

While digital mediation of neighborhood assistance does not yet seem to be working as hoped, we suggest that social distancing restrictions over the course of the coronavirus pandemic (COVID-19) may have led to the feature becoming more popular.

Elderly people in particular are considered to be at risk of contracting the virus at a particularly high rate [15]. The imperatives and prohibitions on contact restrictions—including to younger family members—introduced during this study were intended to protect this population group in particular. Some of the digital solutions presented here aimed to provide help when family support is not possible, for example, and there were also some projects that provided information and opportunities for communication.

Five of the seven projects surveyed in this regard recorded an increase in use since the introduction of contact restrictions, such as an increase in page views or an increase in active users (in one project by about 30%). The number of users also increased in all seven projects, albeit to varying degrees. In some cases, five times as many new registrations as usual were observed. However, the contact restrictions in three projects overlapped in time with the expansion of the app into new areas, so more people also had access to the systems.

In some cases, the digital solutions were used differently than before the contact restrictions. For example, depending on the project, users would occasionally or increasingly offer help to their neighborhood via the platforms. In one project, the number of bid/search offers increased, digital “meet-ups” took place more often and the newsletter feature was in greater demand (IP1). In another project, municipalities used the push message feature more frequently to send updated notices and news to users (IP19). In addition, it was reported that more information was shared, e.g., about city assistance services, COVID-19 senior citizen hotline, telephone health advice, shopping assistance, etc. (IP3). At the same time, it was noted in one project that the previous most frequently used feature of the events calendar was now hardly called up due to the cancellation of almost all events, which was also likely to have an impact on the general use of the app (IP3).

Two projects reported an increase in offers of help and/or requests for support, e.g., from organizations and from neighbors via the app. In contrast, an interviewee of another digital solution, which was used exclusively for the procurement of neighborhood assistance in one village, reported no requests at all during this time. This was due to the village structure: there were more family members at home who could do the shopping, for example. These differences were also likely due to the different target groups of the respective apps. For example, two projects mentioned that offers of help were largely omitted due to the restrictions on contact and the fact that many of the volunteers belonged to the at-risk group. The apps were therefore mainly used to draw attention to other services (IP1, IP7). Figure 2 summarizes the results of the additional study:

In most cases, therefore, we can speak of a change in the use of digital solutions and their functions in the course of the coronavirus restrictions rather than an actual increase in digitally mediated neighborhood assistance. Nevertheless, some of the projects proved to be supportive. In addition, two respondents to this short survey noted that the COVID-19 crisis led to greater engagement with digital support options. People recognized that there was potential in digital solutions or online-based systems. There was more trial and error to see what works. Senior citizens were also becoming more open to the topic of digitization (IP19; IP12).

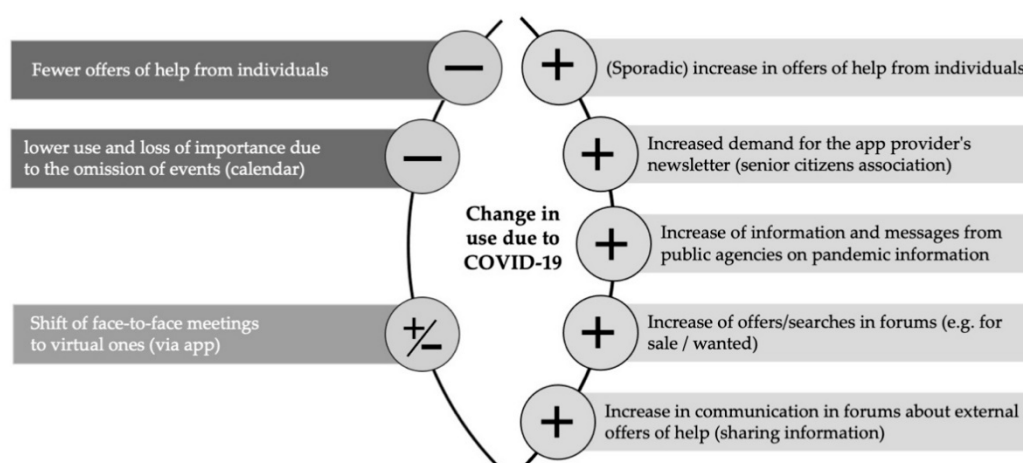


Figure 2. Change in use of the studied digital solutions during the COVID-19 pandemic in the area of communication/participation.

3.6.3. Requirements for Digitally Supported Neighborhood Assistance

Before implementing a digitally supported neighborhood assistance solution, it is important to create an awareness of local needs and suitable framework conditions. This requires an assessment of (local) needs and an investigation of the potentials and offers of assistance on site in order to find a digital solution that is a perfect fit. The solution does not necessarily have to be (purely) digital. It is a development process in which municipalities and other users have to be accompanied and supported (IP12; IP18). In a further step, it makes sense to network existing and new analog offers (neighborhood help, meetings, exchanges, etc.) on site with the digital solution and to use synergies. The use of network effects is particularly effective when actors with an extensive reach, such as housing associations, municipality(ies), associations, neighborhood or city quarter managers, etc., are involved. This promotes the dissemination of the project and creates access to the target groups. In one research project, for example, acceptance of the app offered was lower in neighborhoods with many individual tenants than in ones with many tenants of a housing cooperative that was itself active in the app (IP3).

Since the added value of digitization generally lies in simplifying and accelerating processes and tasks, usability is also important for the use of digitally mediated neighborhood assistance. The design should be based on the main areas of use and target groups. If people with little computer experience are to be reached, the platform/app should be designed to be as simple and intuitive as possible to facilitate access (IP13). In some projects, (analog) training courses were organized for users, on the one hand to make the platforms more widely known and, on the other hand, to familiarize people with no or little computer experience with the technology (IP3, IP11). In some projects, there were also on-site contact persons who could be visited in case of problems with use (e.g., IP18, IP3) or who could come to the users' homes (IP1). If a digital solution is developed and operated by private individuals or an association of volunteers, the question also arises after some time about the takeover by other people, if the founding members can no longer do so, for example, for age reasons (IP14). If no volunteers can be found to continue the project, another form of organization has to be found so that the project can continue.

Many of the respondents emphasized the importance of data protection. This was very important especially in direct assistance, which was why only concrete contact data were communicated in one project once the acceptance of assistance was established. A special explanation of what data were needed, how the data were processed and who would have access to this data was important in order to gain the trust of the users (IP9). The results of the evaluation showed that the use should be free of charge, at least for helpers (e.g., IP12).

One interviewee noted that simply providing people with technical access to a digital solution was not sufficient. It requires someone on site to take care of it full-time, review content, and keep the project running (IP3: 396–402). Especially in rural areas a multiplier or an initiator in town is needed to do more than the initial rollout, someone who really cares (IP13: 366–368). A supervisor and networker are also necessary for the coordination of volunteer services, since it requires not only an app but, above all, the organization behind it. According to another interviewee it is a socio-technical system, and the app is only a small part of it (IP1: 137). Accordingly, not only is a supervisor needed, but also an established structure (IP1), e.g., with regard to the offers that are to be mediated via the platform. Particularly in the case of volunteering, this means that, for example, a neighborhood organization or other association of volunteers needs to be in place. Another interviewee mentioned in this context that the success of a social network also depends on how it encourages citizens to participate (IP15). Therefore, in many projects there were people, groups of people or institutions who, for example, were available to users as contact persons when using the digital solution, entering (local) content, acting as local networkers and organizers in town, or providing (initial) technical support. In the words of an interviewee, such project support was absolutely indispensable for the sustainable existence of such a project because it was not self-sustaining, i.e., in terms of dynamics (IP11: 190–191). According to interviewees, if possible, the networker should be a full-time position or be taken over by a permanent employee whose workload should not be set too low. This was particularly important in the case of large-scale projects with a broad area and various stakeholders. In smaller projects, on the other hand, where the digital solution was limited to just one function or village, it would not be necessary to professionalize the supervisor function.

Another important point in the use of digital solutions for the procurement of assistance is the consideration of those providing assistance. In our cases, this was often a predominantly older group of people. In one project, the neighborhood assistance organized via the digital solution in a municipality had to be discontinued in 2019 after only half a year, as a large proportion of those providing assistance did not have computers or smartphones and were therefore unable to use the platform. For the coordinator (administrative employee of the municipality), this did not mean any time savings compared to the traditional, analog approach (IP6). However, the same platform was successfully used in another municipality for neighborhood assistance. Here, volunteers over 65 years did the coordination (IP12). Another interviewee emphasized the flexibility that had to be given to the helpers. One must be much more responsive to the needs of the helpers, regardless of age. For example, everyone should be granted free time, for example, for longer trips, and the helpers should not have to worry about who would care for those seeking help during this time (IP9). In order to be considerate of volunteers, only times should be considered when they actually want to help and in their desired geographical areas. Therefore, it would be necessary that an association or other organization takes care of the coordination (ibid.). Social commitment should be an enrichment for the individual, not a burden. This precisely tailored procurement would be much easier to implement with a digital solution (IP9). To keep the workload for coordinators as low as possible, it would make sense for help seekers, helpers, institutions and everyone else to maintain their data themselves and update it accordingly (IP12; IP9). Our main findings on requirements for digitally supported neighborhood assistance can be found in Table 3 below.

Table 3. Requirements for digitally supported neighborhood assistance: main findings.

General Framework Conditions	
1. <i>Creation of local awareness:</i>	Educate local decision makers; identify needs and address local issues
2. <i>Establishment of technical framework conditions:</i>	Ensure minimum Internet availability
3. <i>Support for analog services:</i>	Support of existing and new analog offers on site (neighborhood help, etc.) for networking with the digital solution
Customized Solutions	
4. <i>Adaptation to local needs:</i>	Upfront investigation of potentials and offers of assistance on site to find a precisely fitting digital solution
5. <i>Selection of a suitable spatial dimension:</i>	Sensible choice of the spatial dimension according to financial, organizational and structural circumstances (lower and upper limits)
6. <i>Consideration of the needs of those providing assistance</i>	
Organization and Management	
7. <i>Ownership in cooperation:</i>	Cooperation with partners or neighboring municipalities
8. <i>Use of synergies:</i>	Use of platform systems for several organizations (municipalities, neighborhoods, etc.) to minimize maintenance; take up existing structures on site before developing new
9. <i>(Municipal) support on site:</i>	Support by local decision makers; proactive engagement of (political) representatives
10. <i>Securing permanent structures:</i>	Anchoring in suitable structures that ensure longer-term use; securing a “successor” if a digital solution is developed and operated by volunteers
11. <i>Introduction of a caretaker:</i>	Create the position of a full-time, low-threshold caretaker in close proximity to the users, as a multiplier, local networker, and for (initial) technical support
Effort and Costs	
12. <i>Consideration of effort and (follow-up) costs:</i>	Realistic assessment of personnel effort; consideration of personnel, operating and usage costs (especially for open-source codes)
13. <i>Use of synergies in development:</i>	Reuse and further development of existing digital solutions, instead of new developments and “isolated” solutions
Use and Acceptance	
14. <i>High user friendliness:</i>	Consideration of simple, intuitive and barrier-free operation
15. <i>Strengthening identification to promote use:</i>	Selection of suitable area size citizens identify with
16. <i>Use of network effects:</i>	Involvement of housing associations, municipality(ies), associations, neighborhood management, etc.
17. <i>Accompanying users during the digitization process:</i>	offer workshops and/or low-threshold access for introductions and usage problems; run analog and digital in parallel to facilitate transition
Secure Access	
18. <i>Pursuit of active data protection:</i>	Creation of a data protection concept; avoidance of a business model involving data selling; active education about how data are processed; use of clear names
Financial Support	
19. <i>On-site financial support:</i>	Financial support for digital solutions as a “citizen service” by municipalities, business development or, e.g., housing associations
20. <i>Top-down funding structures:</i>	Establishment of a sustainable funding structure to keep established projects alive in the long term

4. Discussion

The digital solutions examined in this study aimed to support the networking of different individuals and organizations to ensure good home-based care and support. The results of our study show that they also work in the field, yet certain requirements have to be met for the introduction and use of digital solutions to lead to sustainable networking.

An important aspect here is that “you don’t just put technology over people” (IP18) just because it is technically possible. All people, and especially older adults, who have had little or no experience with digital media, should be brought along. In 15 years, according to one interviewee, the digital skills of older adults will also be more advanced. In the meantime, it is still important to run digital and analog in parallel, otherwise there is a risk of losing a very large group that can benefit from digitization.

In some projects, the promotion of face-to-face interaction was an explicit goal. In other words, the app is a short-term, technically supported bridge if other channels are not available. Some interviewees confirmed that new physical contacts resulted from the digital exchange. As our research shows, new direct contacts in the neighborhood can result in the area of “offer/share/lend”. In this case the digital solution is a door opener. The digital solution was described as a “digital tool” that has also brought people together in analog form, resulting in social contacts and further projects (IP18: 33–34).

When voluntary neighborhood assistance was offered through public forums where specific arrangements were made bilaterally, it was not possible to ascertain whether and to what extent the assistance was actually offered or accepted. However, it was still found that not all functions were accepted as hoped. If the goal of the project is to provide volunteer care for individuals or to relieve family caregivers, our data showed that help should be organized through a person or institution (depending on the spatial size). To increase trust, helping volunteers should be registered and trained. Nevertheless, it should not be expected that the introduction of a digital solution will lead to greater acceptance. A reluctance to use help is not necessarily due to digital access.

Furthermore, it became apparent that proactive local engagement is important, especially before and during the introduction phase. Representatives of municipalities, such as mayors or councils, should be present and nudge citizens to participate in the project (IP18). Digital projects gain momentum and consistency through the support of local decision makers, at least ideally, and if necessary, also in terms of personnel and funding.

Moreover, a sensible choice of the spatial dimension of the digital solution according to financial, organizational and structural circumstances is central. To ensure that distances to (analog) services and volunteer activities are not too far, and that travel times for administration and supervision do not become too long, an (individual) maximum spatial dimension must be defined. It is important to note that a critical mass of users is necessary (especially in the case of social media with exchange functions) so that the digital solution is self-sustaining. If the defined critical mass cannot be achieved for structural reasons (dispersed or small areas), it makes sense to enter into partnerships with municipalities that share part of the running costs of the app free for use. For larger projects, it may be a good idea to let users decide for themselves in which designed area they want to range digitally and accordingly share information with others.

In addition to basic Internet availability, technical requirements include simple, intuitive, and low-barrier operation, as well as a need-based design and presentation that is appropriate to usage priorities and target groups so that the technology is accepted and used. It has been shown that the use of additional or specific hardware (tablets, smartphones) has a hindering effect. If possible, one should aim for universal use of end devices that are already present in households or among users (e.g., smartphones) in order to avoid additional costs and technical support. Synergies and network effects can also be usefully exploited locally in the provision of software, for example by using platform systems that enable several organizations (municipalities, neighborhoods, etc.) to access the same system, which minimizes development and maintenance work for the individual organizations. Before commissioning time-consuming and costly development or programming, available software components (if existing) should be examined for use, as well as digital solutions that have already been tested. Again, it is important to create an analog interface (e.g., contact person as a representative) to allow stakeholders without computers and/or smartphones to participate.

This analog interface leads directly to the important position of the networker/multiplier/supervisor, especially during the introduction, but also to secure the continuity of the project in the long term. This is a person who should be available on site at a low threshold and act as both a multiplier and local networker on the ground and can provide (initial) technical support and complaint management if necessary. The supervisors' responsibilities may include not only the networking of the actors and accessibility, but also the organization of workshops and/or low-threshold access to contact persons on site in the event of usage

problems when dealing with the digital solution. This may also include introductions to the digital solution and general smartphone, computer or digital training.

Depending on the focus of the project, it makes sense to combine in this position initial information about digital care-offers. Generally, favorable synergy effects can also be seen here if the place of contact is chosen cleverly, e.g., in the coffee meeting place of the clubhouse, senior citizens' office, etc. Depending on the spatial distribution of the digital project, the interviewees suggested a central point of contact or regular visits to the relevant locations.

The last point not mentioned so far is the consideration of corresponding personnel, operating and usage costs (e.g., server or hosting and license fees). Since the deployment of digital projects concerns the area of services of general interest, the interview partners called for financial support of digital solutions as a "citizen service" by municipalities, business development or, e.g., housing associations (IP1: 300–305). In order to ensure sustainable and long-term deployment, funding should be anchored in suitable structures that are funded outside of time limits. This would require building a sustainable funding structure to keep established projects alive in the long term. The costs also include payment for the supervisor position. Many small municipalities often do not have the means to finance this position, so according to one interviewee, it could make sense to set one up at least at the district level (IP18). In addition, when several municipalities join forces to jointly implement a digital solution, it is important to take into account the concerns of the smaller local municipalities.

5. Conclusions

In our study, we examined 12 different digital solutions, such as platforms and apps in Germany, that aim at communication and/or networking of those needing support and of formal and informal helpers and which address older adults in home-based living settings as a (sub-)target group. The aim was also to find out what requirements have to be met for the dissemination and transferability of these digital solutions, especially in rural areas.

The results show that sustainable digital networking in the examined examples is a matter of socio-technical systems whose success and longevity depend primarily on the interaction of the participants and the use of favorable synergies. Before introducing a digitization project, it is important to create an awareness about existing (general and specific) problems on site and how they can be solved. This does not necessarily always have to result in a digital solution. Also, in view of demographic change, it is important to address the issue now and figure out which technical options are available, and which could help in the future. It makes sense to integrate existing and new analog offers on site (neighborhood help, meetings, etc.) and their stakeholders within the digital solution in order to create increased value. Requirements for the digital solutions consist of user-friendly technology, which is oriented in its design to the usage scenario and the target groups and thoughtful spatial scale of use that is also oriented to the desired usage cases. Furthermore, it is crucial to employ an accompanying "supervisor" as direct contact, networker and driver, especially in more dispersed rural areas. In addition, projects depend on a deliberate planned process with the involvement of stakeholders and potential users.

It is to be expected that acceptance problems by users due to the (complexity of) technology will decrease over the coming years. This is helped by the fact that more and more older people in Germany are using smartphones and the Internet, and at least those aged 60 to 69 today are gradually catching up with younger cohorts [17]. It is assumed that the COVID-19 pandemic will lead to an increase in Internet use among the elderly as well. The pandemic is already showing itself to be a driver of virtual use in our projects studied, while at the same time eliminating important face-to-face contacts that were organized through the digital projects. This impact of adoption, acceptance and use of digital projects should be further examined.

As our interviews show, digital solutions can help to support networking and the procurement of (neighborly) help, e.g., in order to offer precisely fitting assistance. However,

the acceptance of these technical tools is not yet as high as some providers would like. The outcome of the COVID-19 survey and the interviews with stakeholders of projects with a voluntary neighborhood assistance also show that there are more people offering to help than there are people wanting to accept help. However, from the interviewees' point of view the low acceptance of help via the platform has less to do with the technology than with the general rejection of help from unknown persons. Nonetheless, it can be assumed that in the course of demographic change and the shortage of professional caregivers, the need for voluntary and neighborly help and support will increase, and with it (forced) acceptance. Future developments of digital solutions in this field will have to consider how to deal with this.

The results of the study also show that, especially in rural or less densely populated areas, digital solutions offer a promising contribution to realize sustainable communication, participation, support and care for the elderly. In rural areas, too, we found a number of consistent projects that focus on older people, although the main focus still primarily lies on urban areas. A transferability is possible, but different conditions have to be considered. This is especially true for spatial scale of use and permanent structures on site. Also, technology alone is not enough, the social sphere behind it and analog offers are as important. Further studies in this field have to be applied.

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