AAL PROGRAMME	**PersonAAL**	

PersonAAL active and assisted living

Deliverable 1.4b

Techniques for Social Support (revised)

Responsible Unit: FCID

Contributors: CNR, USI, SUN

Document Technical Details:

Document Number	D1.4b
Document Title	Techniques for Social Support (Revised)
Version	2.0
Status	Final
Work Package	WP1
Deliverable Type	Report
Contractual Date of delivery	30/03/2018
Actual Date of Delivery	10/04/2018
Responsible Unit	FCID
Contributors	
Keywords List	Social Support, Customisation, Persuasion
Dissemination Level	Public

Document Change Log:

Version	Date	Status	Author	Description
1.0	29/03/18	Draft	FCID (José Coelho)	Draft ready for Review
1.1.	04/04/18	Draft	CNR (C.Santoro)	Review
1.2.	04/04/18	Draft	Reply (C. Chesta)	Review
2.0	05/04/18	Final	FCID (José Coelho)	Final Version

Contents

1 INTRODUCTION

Essential to the PersonAAL project's overall goal of prolonging independent living for older adults, is the focus on increasing daily activity among system users. This includes not only the physical domain but also the social context, be it by helping users to set goals, suggesting behavioral changes they need to adopt, or by alerting them when a decreased level of activity occurs. In this sense, the combination of physical and social domains can be important: by suggesting users to do some physical activity, the system should also suggest social opportunities as a way to facilitate that same activity. This document provides a revised overview of the concepts being implemented in the PersonAAL project to provide users (elderly and caregivers) with intuitive social support.

In order to explain how social mechanisms are defined and operationalized in this context, a general overview of how social interactions have been implemented in the past is paramount.

When reviewing tools developed in the last 15 years, three distinct contexts of particular interest emerged: 1) the ability to share experiences and knowledge with others; 2) the ability to facilitate information transfer or to communicate with others; and 3) the ability to get in contact with others (be it family, close friends or neighbors).
Regarding the first, the work of Santana et al. [Santana2005] was among the first to support this by implementing a digital web-based family newspaper through which both older adults and their relatives could share important information like personal reminiscences and cultural stories. In the same year, Brunette et al. [Brunette2005] targeted the same issue differently by building a connection between individual homes and a local community centre, creating a digitalized support network for older adults living alone where each individual could share information with the others.
Regarding the second context and with the only goal of establishing better ways of communication between older adults and family members, both Lindley et al. [Lindley2009] and Vetere et al. [2009] focused on sharing photos between older adults and their relatives. While the first one focused on asynchronous messages to not create the sense of social obligation, the latter focused more on developing a technical solution probed to create new experiences. Additionally, a wide range of work followed similar principles like Giorgi et al. [Giorgi2011] and Gaver et al. [Gaver2011] systems, which made use of digital mementos and photos as a tool to increase social interaction.
Combining the first and the second context, Vutborg et al. [Vutborg2010] and Raffle et al. [Raffle2011] developed storytelling systems, which explored grandparents and grandchildren sharing over distance. These did not only help in carrying out every-day tasks but also offered functionalities facilitating the communication with others.
Concerning the third context, we report a great set of examples: Waycott et al. [Waycott2012] created a media sharing system, which encouraged older adults to build social connections by sharing messages and photographs with each other; Grosinger et al. [Grosinger2012] was one of the first to make use of physical activities to promote social engagement between older adults; and Lindley et al. [Lindley2012] developed Wayve, a system capable of increasing

communication with relatives by providing features like the one-click message sending, the possibility to scribble messages and to send personal touches (small videos or signs).
These previous examples formed the basis of social applications targeting older adults, and more recent research seemed to combine all the three contexts into different social systems [Cornejo2013, Baecker2014, Neves2015], including ambient and independent living solutions [Fitzpatrick2015, Lazar2017].

The social support system of the PersonAAL project is inspired by all these concepts, and we aim to embody social mechanisms in the PersonAAL framework and two distinct applications (the Remote Assistant and the Activity Training applications).

In the remainder of this document we start by describing each of the techniques for social support implemented in the PersonAAL project providing an overview of how they work, how they are triggered, and how each component of the system will be involved. After this, we provide a detailed description of the role of every PersonAAL component in these social functions, highlighting also a new component entitled the Purple Robot Module. We finalize with the main conclusions.

2 TECHNIQUES FOR SOCIAL SUPPORT

Inspired by the above-mentioned studies, the PersonAAL system develops and supports a set of functionalities and techniques focused on providing social support (or combining social activities with physical activities). In this section, we present the techniques implemented on top of the PersonAAL framework, capable of fostering social interaction without creating a sense of social obligation. These techniques are focused on the three distinct goals previously identified: get in contact with other people, facilitate communication, and share experience/knowledge with others.

2.1 Get in Contact with Other People

Regarding functionalities that support older adults with opportunities to get in contact with others, PersonAAL will focus on three distinct ways: support the possibility of inviting contacts to a social event, support the possibility of reminding users about social events they have planned on two distinct occasions (every morning and later in the day when the hour planned for that event has passed), and support the ability to suggest users to go for a walk (and in that way increasing social opportunities) when the weather is nice and they are lacking physical or social activity. In the following lines, we provide descriptions for all these functions and how the PersonAAL system will implement them.

2.1.1 Invite to Social Event

Description:

Every time a user has planned a social event (using the calendar function in the Remote Assistant application), and that event is possible to be performed with additional company (going to the cinema, going to the theater, going to a restaurant, going to a pub, religious event, or other related event) the system will suggest inviting someone to go with him/her. The suggestion will be performed by displaying a message reminding the event and the social possibility, regardless of the application (in the Remote Assistant application a “message card” will be shown, while for the Activity Training an Android notification will be issued with the message) and augmenting that message with a motivational message concerning the benefits of participating in social activities. Further options also include the specification of a contact to be suggested (by randomly picking one of the user contacts saved in the system or by selecting one specified as having a close relationship with the user e.g. close family, family).

When:

In the morning (with the goal of making possible for the user to make the necessary preparations for the invitation).

Components involved:

Remote Assistant application: Provides the possibility for a user to plan a social activity by using the calendar/planning function; provides the possibility for a user to specify the type of social activity to perform. Also provides the possibility for a user to add contacts and their relationship with the user, which can later be used in the suggestion.
Rule-creation/Persuasion Model: For supporting the creation of the rule implementing the use case or for providing a caretaker with that possibility.

Adaptation Module: Defines the presentation of the message on the screen of both applications.

2.1.2 Social Reminder

Description:

Every time a user has planned a social event (using the calendar function in the Remote Assistant application), and that social event is still to be reported as done, the system will remind him/her of that. The reminder will be performed by displaying a message describing the activity regardless of the application (and the device context).

When:

In the afternoon (in order to give the user the possibility of still performing the planned activity on that day).

Components involved:

Remote Assistant Application: Provides the possibility for a user to plan a social activity by using the calendar/planning function; provides the possibility for a user to report a social activity as done (every time the user enters the application, it will inquire him/her about the state of passed activities which were not yet reported).

Rule-creation/Persuasion Model: For creating the rule implementing the use case or for providing a caretaker with that possibility.

Adaptation Module: Defines the presentation of the message on the screen of both applications.

2.1.3 Morning Social Reminder

Description:

Once a day, in the morning, every time the user has a planned social activity (created through the calendar function in the Remote Assistant application), the system will remind him/her of that. The reminder will be performed by displaying a message describing the activity regardless of the application (and the device context).

When:

In the morning (in order to create awareness for a planned social activity when a day starts).

Components involved:

Remote Assistant Application: Provides the possibility for a user to plan a social activity by using the calendar/planning function.

Rule-creation/Persuasion Model: For creating, the rule implementing the use case or for providing a caretaker with that possibility.

Adaptation Module: Defines the presentation of the message on the screen of both applications.

2.1.4 Weather Good For a Walk:

Description:

When the weather is good (15ºC to 25ºC and Sunny) and the user is lacking social activity (has not reported a social event in the last 48 hours) or physical activity (step count is lower than the average in the last week), the system will suggest going out for a

walk. The suggestion will be performed by displaying a message reminding of the physical activity or social opportunity and augmenting it with other motivational messages concerning the benefits of going out to do some exercise. This combined message will be delivered by the system regardless of the application (and the device context). Further options could support the possibility of specifying or selecting a contact with whom the user would like to go with.

When:

Early afternoon (or at a user specified hour).

Components Involved:

Remote Assistant application: Provides the possibility for a user to add contacts and their relationship with the user, which can later be used when selecting someone to go with him/her.

Rule-creation/Persuasion Model: For creating the rule implementing the use case or for providing a caretaker with that possibility.

Adaptation Module: Defines the presentation of the message on the screen of both applications.

Context-Manager: Provides information about the current weather, which will be used by the system to trigger this use case. It also provides information regarding the user's step count and reported social activities.

Purple Robot: Provides information related to the user location.

2.2 Facilitating Communication

In terms of facilitating communication or information transfer between older adults and their relatives or friends (or caretakers), the PersonAAL project implements three distinct functions: the possibility of suggesting users to call someone (a contact) when he/she has not performed calls from the cellphone for a defined number of hours (typically 24 hours, but this can be specified by the user or the caretaker); the possibility of achieving the same but with an SMS or MMS; or the possibility to call their caretaker when that has not happened for a while (also defined by the caretaker). In the following lines, we describe in more detail how these functions are implemented in PersonAAL:

2.2.1 Suggest Call to Contact

Description:

Every time a user has not performed calls from his/her mobile phone in the last 24 hours the system will present a suggestion that he/she should call someone. The suggestion will be performed by displaying a message regardless of the application (and the device context). Optionally, and depending on the user-trial results concerning this feature, the no-call period could be enlarged to 48 hours or to a period specified by the caretaker. Further options also include the specification of a contact to be suggested (by randomly picking one of the user contacts inserted in the system or by selecting one specified as having a close relationship with the user – close family, family -).

When:

Early afternoon (to make possible for users to call their relatives after lunch when they are typically more available).

Components involved:

Remote Assistant Application: Provides the possibility for a user to add contacts and their relationship with the user, which can later be used to suggest a call.

Rule-creation/Persuasion Model: For creating the rule implementing the use case or for providing a caretaker with that possibility.

Adaptation Module: Defines the presentation of the message on the screen of both applications.

Purple Robot Module: Collects information on the user calls for the specified period.

2.2.2 Suggest SMS/MMS to Contact

Description:

Every time a user has not performed calls from his/her mobile phone in the last 24 hours and the system identifies she/he typically interacts socially through her/his smartphone with SMS or MMS, the system will present a suggestion that he/she should send a message to someone. The suggestion will be performed by displaying a message regardless of the application (and the device context). Optionally, and depending on the user-trial results concerning this feature, the no-call period could be enlarged to 48 hours or to a period specified by the caretaker. Further options also include the specification of a contact to be suggested (by picking one of the user contacts specified in the system, by selecting one specified as having a close relationship with the user – close family, family -, by identifying a contact with whom the user tends to have frequent contact, or by caretaker pre-selection).

When:

Early afternoon (to make possible for users to SMS their relatives after lunch when they are typically more available).

Components involved:

Remote Assistant Application: Provides the possibility for a user to add contacts and their relationship with the user, which can later be used to suggest a call.

Rule-creation/Persuasion Model: For creating the rule implementing the use case or for providing a caretaker with that possibility.

Adaptation Module: Defines the presentation of the message on the screen of both applications.

Purple Robot Module: Collects information on the user calls for the specified period and identifies if the user typically communicates using SMS instead of calling. Optionally, this module can also identify the contact with whom the user interacts the most, or a contact he/she is not messaging for an abnormal (e.g. too long) period of time and use that information to incorporate that contact in the suggestion.

2.2.3 Suggest Call to Caretaker

Description:

Every time a user has not performed calls from his/her mobile phone to his/her caretaker for a period specified by the caregiver, the system will present a suggestion

that a call should be made. The suggestion will be performed by displaying a message regardless of the application (and the device context).

When:

Late Morning or Early Afternoon (to make possible for users to call their caretakers when they are typically more available).

Components involved:

Rule-creation/Persuasion Model: For creating the rule implementing the use case, or for providing a caretaker with that possibility.

Adaptation Module: Defines the presentation of the message on the screen of both applications.

Purple Robot Module: Collects information on the user calls to the caretaker for the specified period.

2.2.4 Chat with Others

Description:

The Remote Assistant application will incorporate a functionality that will support its users with the ability to directly communicate with other users of the system who are also their contacts. Not only this will be available at any time in a corresponding option in the menu of the application. Additional options will also consider the possibility of suggesting the initiation of a chat conversation whenever the system detects that there is some decreased communication between two contacts and as a way of tackling social isolation.

When:

Any time

Components involved:

Remote Assistant Application: Provides the possibility for a user to initiate a chat communication with another contact, which is also a user of the system by fully implementing the functionality in its user interface. Every message written on the chat functionality is sent to Context Manager for the system to keep a full history.

Rule-creation/Persuasion Model: For creating the rule implementing the described use case related to a decrease of use of the functionality between the user and other contacts.

Context-Manager: Saves all messages sent through the Remote Assistant application as well as all the information related to that message (content, timestamp, target, etc.) and makes possible for the Remote Assistant application to always keep an history of the chat (as well as for the background implementation of the whole chat functionality).

Adaptation Module: Defines the presentation of the message on the screen of the Remote Assistant application.

2.3 Share Experiences or Knowledge with Others

Finally, PersonAAL will focus on two distinct functionalities for providing older adults with the ability to share experience or expertise with others. The possibility of recommending interesting activities when reporting about them on the Remote Assistant application; and the

possibility of doing the same for exercises when reporting them on the Activity Training application. In the following lines, both functions are broadly described.

2.3.1 Recommending Interesting Activities

Description:

Every time a user is reporting an activity (social or physical) he/she performed (through the Remote Assistant application) the UI offers a button with the option to recommend the performed activity to one of his/her contacts. An option could be for the system to automatically suggest a contact from the user contact list (selecting it by proximity of relation, by interests in common, or by caretaker recommendation/specification). Other option will also be supported with the possibility for the activity to be recommended directly by the caretaker to the user.

When:

When reporting an activity as done.

Components Involved:

Remote Assistant Application: Provides the possibility for a user to explicitly report a social or physical activity as done. Also provides the possibility for a user to add contacts and their relationship with the user, which can later be used for suggesting the reported activity.

Rule-creation/Persuasion Model: For creating the rule implementing the use case, or for providing a caretaker with that possibility.

Adaptation Module: Presents the suggestion on the screen of the targeted contact when using the Remote Assistant application.

2.3.2 Recommending Exercises

Description:

Every time a user is reporting on a completed exercise he/she performed (through the Activity Training application) the UI offers a button with the option to recommend the performed exercise to one of his/her contacts. An option could be offered with the possibility for the system to automatically suggest a contact from the user contact list (selecting it by proximity of relation, or by caretaker's recommendation/specification). Other options will also be supported with the possibility for the exercise to be recommended directly by the caretaker to the user.

When:

When reporting an exercise as performed.

Components Involved:

Remote Assistant Application: Provides the possibility for a user to add contacts and their relationship with the user, which can later be used as targets of the recommendation.

Activity Training Application: Provides the possibility for a user to explicitly report an exercise as performed.

Rule-creation/Persuasion Model: For creating the rule implementing the use case, or for providing a caretaker with that possibility.

Adaptation Module: Presents the suggestion on the screen of the targeted contact when using the Activity Training application.

While the functions just described are the ones currently being implemented in the system, until the end of PersonAAL additional ones may be originated and implemented, which may take advantage of the project social mechanisms. While dropping any use-cases/functions regarding social services like Facebook (which have been described in previous versions of this document), some others involving data resulting from the use of the described applications as well as the Physical Rehabilitation application may result. This can be done because all this information is already made available by PersonAAL's Context Manager. In the next section of this document we provide further information on the role of this component and how the information it contains can be used to create rules and consequent social functions.

3 PERSONAAL SUPPORT FOR SOCIAL TECHNIQUES

In order to accomplish the previously described social functions, PersonAAL will make use of several of its modules and applications (which are explained in detail in D.1.5.Integrated Platform). In the following paragraphs we identify each of those components and explain how they contribute to implement the social mechanisms described. We also introduce a new PersonAAL component entitled Purple Robot Module which was based on previous research and implemented into the project with the goal of further enhancing PersonAAL social capabilities.

3.1 Context Manager

The Context Manager is one of the main vehicles for the support of all social capabilities described, by being the component of the system where every information is both stored and sent to all the other components that subscribe to it. Therefore, information resulting from the use of all the three applications is sent to the Context Manager, which then can send it back to the applications, or to the Rule Editor and the Persuasion Module where this data can be used to create rules or to incorporate triggers for the social functions described.

3.2 Persuasion Module

The Persuasion module is responsible for several processes indirectly related with the provision of social techniques in PersonAAL. The first is the identification of the pre-defined contexts in which certain opportunities will be activated. This means that the Persuasion module is responsible for identifying patterns related with older adults' data collected through the sensors and classifying those patterns as deviations in the user behavior or not (e.g. abnormal social interaction levels, abnormal physical activity levels, etc.). When deviations occur, the module is also responsible for defining the appropriate persuasive strategies (interventions) to be performed in order to change user behavior. By applying persuasive techniques this module is increasing older adults' chances of accepting the proposed interventions. Since several of these will be related with social opportunities (e.g. if the user needs to increase social interactions or is lacking social activity in the last 24 hours) in this way the likelihood of these social techniques to work will increase. To sum up, the role of the Persuasion module in the described social techniques is indispensable, as any implicit social opportunities related to needed behavior-changing interventions is initiated and partially configured by this module.

3.3 Adaptation Engine

The Adaptation Engine is the PersonAAL component responsible for defining the best way to present any rule defined in the rule editor (and originated from a caretaker-defined trigger, or from a trigger identified by the Persuasion module) in the form of user interface elements. These configurations are dependent not only on user characteristics but also on interaction and application contexts. Therefore, the role of the Adaptation Engine is to define the best way to present each social technique (e.g. size of text, font color, background color, timing of the message, etc.).

3.4 Remote Assistant Application

The Remote Assistant Application is the other main vehicle for the support of most of the social functions described, being the main application offering the users the ability to plan social activities, or physical activities that can be combined with social opportunities. This is done through the inclusion of several features like the option to designate days and hours to do activities, the option to describe the type (social or physical) or sub-type (e.g. for social activities: going to church, going to the theater, inviting someone over, going out, etc.) of activity, the option to report activities as done (every time a new login is performed on the system), the option to suggest reported activities to contacts, or the option to directly chat with other contacts. Additionally, it is also key for supporting interventions (e.g. to increase physical activity) initiated by the Rule Editor and the Persuasion Module, providing ways of combining such interventions with social opportunities (e.g. provides the opportunity to specify user's interests that can be used to identify contacts to invite). In summary, it provides the ways to implicitly or explicitly communicate with others, as well as it provides the tools to increase offline social interactions.

3.5 Activity Training Application

Like the Remote Assistant application but in a more specific context, this application supports the planning and reporting of specific exercises with the possibility of suggesting those exercises to others. It also incorporates all persuasive messages generated from the rules implemented by the Rule Editor and the Persuasion Module and whose presentation is dictated by the Adaptation Engine. Additionally, by being implemented as an Android application, it is also capable of receiving each message in the form of an Android alert, creating a type of social awareness that is not possible in the Remote Assistant web application.

3.6 Physical Rehabilitation Application

As was already briefly described, although the Physical Rehabilitation application is not currently used for any PersonAAL social functions, the information generated from its use is being sent to the Context Manager and could integrate additional functions to be implemented in the future.

3.7 Rule-Editor

Social opportunities are not only initiated explicitly by the older adults but can also be initiated by the caretakers. For this to happen the Rule Editor provides the latter with the ambient to create and set up rules based on specific triggers. These rules involve social activities both in a direct manner and as a response to a social need (e.g. suggesting inviting a person to go with if the older adult has planned going to the theater and is lacking social activity) and in an indirect way by combining social opportunities with triggers related to physical activity (e.g. suggesting inviting someone to go for a walk if the older adult has been staying at home for the last couple of days despite planning these kind of activities). Every time a trigger is activated (a condition is verified after going through the user collected data) the rule is fired, and a related user

interface procedure is activated (through the Adaptation Module). Several of these procedures are related to the creation of the social opportunities described in the previous section. Therefore, the Rule Editor makes possible for caretakers to tackle older adults' social needs and at the same time associates physical activities with social activities. Additionally, it is also through the Rule Editor that particular social techniques like the suggestion to call their caregiver if they haven't for 24/48 hours, can be set up or further configured.

3.8 Purple Robot Module

The Purple Robot application (Figure 1) is a sensing and scripting application that enables the creation of context-aware experiences. It was developed in the context of past research, to relate mobile phone data to depressive symptom severity in daily-life behavior [Saeb et al. 2015]. In PersonAAL we made use of that application to develop a module capable of extracting data from mobile phone sensors and collecting and inferring information related with calls, SMS, and application use. As social interaction cannot be limited to digital communication, finding ways to discover with whom older adults were meeting face to face, or if they left home is also important and possible in this module (for example by associating a Bluetooth device to a contact and see if two Bluetooth devices were in the proximity of each other, or by associating a Wi-Fi router to a contact to see if the elder visits this person at home). The Purple Robot Module sends all information related to device sensors to a server which then sends this information to the Context Manager to be subscribed and interpreted by the Rule Editor and the Persuasion Module (or whichever application). In the context of the described functionalities, data related with calls, SMS/MMS and location will be collected on each user that makes use of the Purple Robot module in his/her mobile phone. While not used in neither functions, described data from other sensors is also collected and could be used for additional social functions that can be considered in the future (like the information associated with Bluetooth, applications used, or Wi-Fi networks detected).

Figure 1. Purple Robot application screenshots

4 CONCLUSIONS

This deliverable reports on the techniques for social support currently being implemented in the Project. It presents each social support function describing the involvement of the PersonAAL components, applications and end-users. All described functions are currently in their latest phase of implementation with at least part of them expected to be fully used in the upcoming field trials. Still, additional functions can be implemented until the end of the project as it was also described in this document. Future work will also be dedicated to fully validating these and additional techniques.

5 REFERENCES

Santana2005: Santana, P. C., Rodr´ıguez, M. D., Gonza´lez, V. M., Castro, L. A., Andrade, A. G., 2005. Supporting emotional ties among mexican elders and their families living abroad. In: CHI ’05 Extended Abstracts on Human Factors in Computing Systems. CHI EA ’05. ACM, New York, NY, USA, pp. 2099–2103.

Brunnete2005: Brunette, K., Eisenstadt, M., Pukinskis, E., Ryan, W., 2005. Meeteetse: social well-being through place attachment. In: van der Veer, G. C., Gale, C. (Eds.), CHI Extended Abstracts. ACM, pp. 2065–2069.

Lindley2009: Lindley, S. E., Harper, R., Sellen, A., 2009. Desiring to be in touch in a changing communications landscape: attitudes of older adults. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. CHI ’09. ACM, New York, NY, USA, pp. 1693–1702.

Vetere2009: Vetere, F., Davis, H., Gibbs, M., Howard, S., Feb. 2009. The magic box and collage: Responding to the challenge of distributed intergenerational play. Int. J. Hum.-Comput. Stud. 67 (2), 165–178.

Giorgi2011: Giorgi, S., Talamo, A., Mellini, B., 2011. The ”life frame”: responding to the elderly people’s need of remembering. In: CHI ’11 Extended Abstracts on Human Factors in Computing Systems. CHI EA ’11. ACM, New York, NY, USA, pp. 1381–1386.

Gaver2011: Gaver, W., Boucher, A., Bowers, J., Blythe, M., Jarvis, N., Cameron, D., Kerridge, T., Wilkie, A., Phillips, R., Wright, P., 2011. The photostroller: supporting diverse care home residents in engaging with the world. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. CHI ’11. ACM, New York, NY, USA, pp. 1757–1766.

Vutborg2010: Vutborg, R., Kjeldskov, J., Pedell, S., Vetere, F., 2010. Family storytelling for grandparents and grandchildren living apart. In: Proceedings of the 6th Nordic Conference on Human-Computer Interaction: Extending Boundaries. NordiCHI ’10. ACM, New York, NY, USA, pp. 531–540.

Raffle2011: Raffle, H., Ballagas, R., Revelle, G., Horii, H., Follmer, S., Go, J., Reardon, E., Mori, K., Kaye, J., Spasojevic, M., 2010. Family story play: Reading with young children (and elmo) over a distance. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. CHI ’10. ACM, New York, NY, USA, pp. 1583–1592.

Waycott2012: Waycott, J., Vetere, F., Pedell, S., Kulik, L., Ozanne, E., Gruner, A., Downs, J., 2013. Older adults as digital content producers. In: Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. CHI ’13. ACM, New York, NY, USA, pp. 39–48.

Grosinger2012: Grosinger, J., Vetere, F., Fitzpatrick, G., 2012. Agile life: Addressing knowledge and social motivations for active aging. In: Proceedings of the 24th Australian Computer-Human Interaction Conference. OzCHI ’12. ACM, New York, NY, USA, pp. 162–165.

Lindley2012: Lindley, S. E., Mar. 2012. Shades of lightweight: Supporting cross-generational communication through home messaging. Univers. Access Inf. Soc. 11 (1), 31–43.

Cornejo2013: Cornejo, R., Tentori, M., Favela, J., Sep. 2013. Enriching in-person encounters through social media: A study on family connectedness for the elderly. Int. J. Hum.-Comput. Stud. 71 (9), 889–899.

Baecker2014: Baecker, R., Sellen, K., Crosskey, S., Boscart, V., Barbosa Neves, B., 2014. Technology to reduce social isolation and loneliness. In: Proceedings of the 16th International ACM SIGACCESS Conference on Computers & Accessibility. ASSETS ’14. ACM, New York, NY, USA, pp. 27–34.

Neves2015: Neves, B. B., Franz, R. L., Munteanu, C., Baecker, R., Ngo, M., 2015. ”my hand doesn’t listen to me!”: Adoption and evaluation of a communication technology for the ’oldest old’. In: Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems. CHI ’15. ACM, New York, NY, USA, pp. 1593–1602.

Lazar2017: Lazar, A., & Nguyen, D. H. (2017, May). Successful Leisure in Independent Living Communities: Understanding Older Adults' Motivations to Engage in Leisure Activities. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (pp. 7042-7056). ACM.

Fitzpatrick2015: Fitzpatrick, G., Huldtgren, A., Malmborg, L., Harley, D., & Ijsselsteijn, W. (2015). Design for agency, adaptivity and reciprocity: reimagining AAL and telecare agendas. In Designing Socially Embedded Technologies in the Real-World (pp. 305-338). Springer London.

Saeb2015: Saeb, S., Zhang, M., Karr, C. J., Schueller, S. M., Corden, M. E., Kording, K. P., & Mohr, D. C. (2015). Mobile phone sensor correlates of depressive symptom severity in daily-life behavior: an exploratory study. Journal of medical Internet research, 17(7).