Supporting Older Adults Social Network: the Design of e-Inclusion Communication Services

C. Leonardi, C. Mennecozzi, E. Not, F. Pianesi, M. Zancanaro

Abstract—**This paper presents a study aimed at investigating how domestic communication technologies could be designed in order to profitably intervene in the daily life of elderly people to enhance and enrich their social relationships and to prevent the phenomenon of social isolation. Moving from the identification of typical communication patterns among older adults and their social network, we suggest the importance of discerning between the public and private spheres of socialization in relation to the specific target group of elderly people, as a basis for the design of e-inclusion communication services.**

We discuss the barriers preventing older adults to successfully manage communicative technologies and present the design of two virtual places, the *Social Window* and the *Public Square.*

I. INTRODUCTION

One of the main problems experienced when aging is loneliness, i.e. the subjective perception of being alone [1]. This feeling is often due to a progressive weakening of the social network, whose strength is considered an important predictor of the quality of life [2]. But even when the person lives independently and is active with a satisfying relational universe, loneliness is nevertheless a frequent experience, a fact that is explained by researchers in terms of the loss of motivation, mobility difficulties and health problems. Furthermore, the loss of the partner, and the children living apart have a great impact [3].

The NETCARITY (FP6) project has investigated the design space for the development of acceptable domestic services that promote social contact and strengthen social ties within the social network of elderly people living alone. In this paper we describe the research approach and the interaction solutions for communication in a home environment produced within the Netcarity project. A detailed analysis of elderly people social network and communicative behaviour was conducted as a first step of

the User Centred Design process, by means of semi-structured interviews, focus groups, and scenario-based workshops with a group of volunteers aging from 65 to 89. Findings emphasize the importance of discerning between the public and private spheres of socialization, as a basis for the design of e-inclusion communication services.

We finally present an interaction interface, implemented on a touch-screen, that includes two virtual places (the *Social Window* and the *Public Square*) specifically designed to support elders' e-inclusion.

II. RELATED WORK

Recently, a lot of effort has been paid to investigate how IT technologies can play an active role in addressing the problems deriving from the withdrawal of elderly people into their private sphere [2][4][5].

Some studies point out the challenges of introducing communication technologies into older adults' daily life: for instance, Melenhorst and colleagues [6] identified barriers preventing older adults from using media such as e-mail and the internet. Their results demonstrate the necessity to carefully consider context-related costs associated with the usage of different types of media, and suggest that awareness of benefits is a determinant factor to overcome fears and inhibition toward new technologies.

Other studies focused more specifically on the home environment. The Casablanca project [7] presents useful insights for the design of household social communication devices. Strong and colleagues [8] analyse the peculiarities of the communicative behaviour in a home environment, contrasting it with communication in workplace situations. The authors present prototypes aimed at supporting expressive, private communication as opposed to informative and goal-oriented communication.

As to communication technologies specifically targeted to older adults, researchers have demonstrated the effectiveness of simple interfaces to support older adults who want to continue living independently. The Digital Family Portrait [9], for instance, exploits common household objects to covey information about family's members. By making family members aware of the senior adults' day-to-day activities, the digital portrait aims at reinforcing social support that can be weakened by the geographical distance. The challenge of facilitating companionship in senior populations has been addressed by the Echoes project [10] that designed an interface to encourage individuals to establish social relationships by playing simple games and exchanging digital photos with each other.

Some researches in the field of computer mediated communication have begun to identify the peculiarities of senior citizens communication patterns: for instance, Pfeil

and Zaphiris [11] recognized in empathy a key aspect of the communication among seniors in online communities. Despite these advancements, the HCI field still lacks a clear understanding of the peculiarities of the older adults' social interaction and of the requirements for acceptable communication services aimed to support communicative behavior.

III.   THE USER STUDY

The first goal of our study was to dissect the configuration of the social network revolving around senior citizens by analysing: (i) the composition of the social network, (ii) the channels through which relationships are maintained, and (iii) the social norms and the role of the artefacts in sustaining these relationships.

Starting from these insights, we developed design hypothesis for technological artefacts promoting e-inclusion that were then evaluated in scenarios-based workshops with elders.

A. Contextual inquiries and focus groups

A group of 26 senior citizens aging 65 to 85 (19 women and 7 men) were involved in the research. We first conducted seven contextual inquiries in the elders' homes and three focus groups exploring their quality of life, their domestic and social routines, and the way our subjects experience the challenge of independent living. Attention was paid to their attitude toward IT technology, their use of communication devices, the way these devices sustain, or fail to sustain, social relationships. These initial data provided the starting point for envisaging potential e-inclusion services and the associated applicative scenarios that we evaluated with users.

B. Personas-based scenarios

Scenario-based discussion within five smaller groups of participants was triggered through the presentation of *personas* [12], i.e. fictional characters favouring personal identification, that are depicted as they are involved in domestic daily situations in which communication technologies could profitably intervene by providing connectivity between people and their social network. Different types of communication technologies were presented and discussed during the scenarios workshops. The discussion about the pros and cons of the proposed new technologies went together with the assessment of the perceived benefits and limits of more traditional means older people rely on to sustain their relationships within their social network. In particular the scenarios targeted the acceptability of the following technologies:

a) face-to-face communication through web-cam – both one-to-one and video-conferencing systems to connect the members of the local community;

b)   forum like functionalities through text messages to share opinions, suggestions and information;

c) asynchronous multimedia exchange to share and collectively organize images, audio files, rich texts.

IV.   FACTORS AFFECTING THE DESIGN OF COMMUNICATION SERVICES

From interviews and scenario-based workshops, it clearly appeared that the relational universe of older people is heterogeneous and rich. Users' social network cannot be considered as an indivisible unit of analysis. Different contexts, referents and motivations generate different communication typologies, regulated by specific social norms.

In particular, the following factors stood out as having a significant impact on the way communication and social interaction takes place:

a) The referent of the communication. Elders' social network is segmented into components (relatives, close friends, acquaintances, the group of peers and caregivers) each having its own peculiarities and modalities to initiate and sustain the communication.

b) Motivations and purposes for the social interaction. Relationships ground on different and interconnected needs: social, psychological or practical, each requiring appropriate support in order to be fulfilled.

c) Intimacy and emotional investment. The understanding of the degree of intimacy between older people and the members of their social network is central for the identification of adequate expressive modes to be embedded into a communication device.

d) Anxiety and concerns associated with the management of different communicative situations. In our study we investigated which limits and concerns older people experience in maintaining relationships within their social network and ways to overcome them.

e) Contextual aspects mediating the social interaction. Relationships do not occur in a vacuum but are always mediated by contexts (.i.e. private vs, public spaces, etc.) and artefacts (i.e. telephone, letters, postcards, etc.).

f) Social norms and protocols that shape interactions, regulating their initiation and maintenance.

Starting from the analysis of these factors affecting and shaping social interactions, in the next sections we discuss two main communication situations that occur in elders' social life and discuss the requirements to effectively support them, taking into account older citizens' culture and values.

V.   SUPPORTING CLOSE RELATIONSHIPS

Close relationships, such as those with relatives, adult children and close friends, are characterized "by emotional intensity, self disclosure and a high degree of personal involvement" [13]. Intimate relationships perform several functions: personal support, sociability, physical and emotional closeness, stimulation (see Figure 1). Our findings confirmed that relatives, in particular adult children, and close friends, represent the preferred referents and the relationship with them is the one with the strongest emotional content. Relatives are the main source of safety, protection, and affective support. However, the frequency of the contacts is lower than in the past (sons frequently live far from their parents and have less time to dedicate them) and relationships tend to become looser (for instance, only few older adults in the NETCARITY study reported to have at the moment close friends).
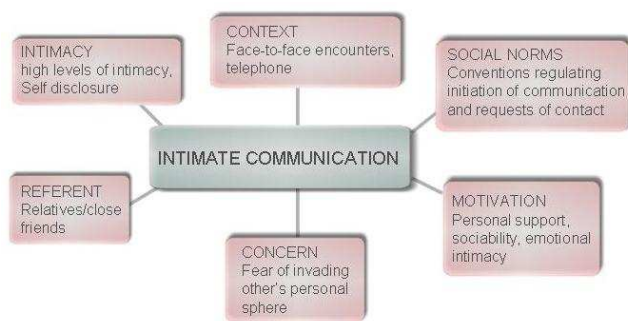
Fig.1 Configuration of factors characterizing intimate communications

A. *Limits of traditional communication technologies*

The telephone is the most used media to communicate with relatives and friends, while other digital technologies are not common among the participants to our study: most of them, for instance, received a mobile phone from their adult children but they do not use it and do not associate it to social goals, but mainly with emergencies and protection functions.

Elders experience a number of problematic situations when communicating with the loved ones through the telephone. Firstly, the telephone is perceived as restrictive in comparison to face-to-face interaction, because of its limitations in conveying emotional and contextual cues. Secondly, elders feel much concerned about the possibility of disturbing their referents – in particular adult children - and invading their private sphere. Our study confirmed the existence of strong cultural norms, e.g.: "calling after 9 p.m. is not appropriate unless a real urgency exists", "children should conduct their lives independently and parents should let them free". The discomfort is made stronger by the lack of information about what the referent is doing and his/her availability, and this often prevents older adults to initiate telephone conversations. Strategies used to overcome these conflicting situations include pretexts and excuses, as when a phone call made to feel less lonely is disguised as aimed at reaching practical goals.

B. *Breaking loneliness and signaling emotional closeness*

Even if face-to-face communication is considered as the most adequate communication mode to keep in contact with the loved ones, our subjects valued positively also other less demanding ways of breaking isolation. Discussions during scenario-based workshops revealed the benefits of sharing symbolical artefacts signalling the emotional proximity. Participants discussed the importance to receive and send unexpected objects, such as little presents, letters, postcards or short notes conveying the message "I'm thinking of you". This practice has several advantages. First of all, it enables an intimate but non-intrusive communication and appears less demanding than engaging in a face-to-face communication. Secondly, the tangibility of an object assures its persistence (it can be stored as a gift). Finally, participants suggested that sending or receiving such objects can work as a means to test willingness to engage in a conversation and may encourage people to shift the communication to other channels (telephone, face-to-face encounters).

VI. INTERPERSONAL COMMUNICATION WITHIN THE GROUP OF PEERS

Interpersonal communication requires in some cases additional guarantees and a stronger mediation. Our study revealed the peculiarities of the relationship between older people and the peers they regularly meet at, e.g., aggregation centres, or the other members of the local community. Differently from what happens with relatives and close friends, peer group relationship is grounded on the sharing of common experiences, on the participation to collaborative activities (games, formative and recreational activities) within a community, and does not feature intimacy as a major property. Peers are a key resource for sharing and exorcise own limits, improving oneself and avoiding withdrawal from social contacts. Despite their importance, interactions within the peer group depend on the existence of an appropriate social context and of mediating organizations – e.g., the local University for the Third Age or seniors' aggregation centres (see Figure 2)

Fig.2. Configuration of factors defining the relationship between older adults and their peer group

A. *The mediating role of public organizations*

The relationships with acquaintances or members of the peer group are characterized by the fear of intrusions in the own private sphere, the need to clearly separate the private and the social life, and the necessity to control the self-disclosure process, by hiding details about own fragilities. As a consequence, relationships with peers tend to be experienced only in trusted contexts, organized around shared and transparent norms and protocols. Social interaction with peers rarely takes place at older people's homes: even if people participate in the same activities in the community centres (cards playing, painting courses, etc.) they rarely meet at home. On the contrary, community centres and public places organized around shared and transparent social protocols are considered excellent places where interaction with peers can develop: the boundaries between the own private sphere and the outside can be controlled, also thanks to the presence of social workers and facilitators who, being aware of the importance older adults assign to protecting details of their life, can provide contexts and resources to manage the self-disclosure process.

In our focus groups, even if a remote, forum-like, communication channel was generally valued as a useful and acceptable way to actively participate in social activities, participants emphasised the necessity to frame communication with peers within a secured context. For example, they mentioned the need of a guarantor and the

availability of shared protocols regulating the initiation and closure of the communication.

B. Framing the communication as a social activity

Other findings suggest the importance of accomplishing practical activities together as an indirect mean to stimulate and strengthen social ties. Interviews with social workers confirmed that doing something together lowers the difficulties of initiating a communication, provides resources to manage it, and shapes the relationship in a way that it is easier to control the entrance and the exit from the social situation and to control the self-disclosure process. The importance of accomplishing practical activities together – in small or large groups – is indeed a major motivation of community centres.

VII. DESIGNING PRIVATE AND PUBLIC SPACES TO SUPPORT E-INCLUSION

An artefact designed to support and enhance social network of older adults should provide interaction solutions reflecting norms and conventions specific to the different communication typologies, help to manage the self-disclosure process and the trust issue of trust arising with in non-intimate relationships. The findings from our study also suggest the importance of reframing the categories of "public" and "private" in relation to the specific target group of older people, as a basis for the design of social inclusion services.

We developed a user interface that exploits touch-screen technology, whereby interaction is based on the direct manipulation of the digital objects, using natural gestures recalling real world motor patterns (e.g. scrubbing with the finger an object in stand of the "erase" command). The interface avoids usage of standard computer tools, such as contextual menus, and can be intuitively navigated thanks to the *zooming dynamic*. When an element is touched, it is activated, enlarged and shifted from the background to the foreground, whereas the dimensions of the other elements are reduced. This guarantees that all the elements visible on the interface are kept available to users, though the attention is focused on the current task (for more details see [14].

The differences between the communications within the intimate and private sphere, and between those taking place within the public sphere where rendered by means of two distinct virtual places, the *Social Window* and the *Public Square* (see Figure 3).

Fig.3 The Netcarity interface (the Social Window is displayed on the upper left corner, the Public Square in the middle)

A. Social window – support for the private sphere

Part of the difficulties in communicating within the intimate sphere is due to the absence of information about the respondent' availability and willingness to be contacted, and to the device (the telephone) limited bandwidth that do not support appropriate conveyance of emotional content.

The *Social Window* was designed to support intimate and expressive communication with people belonging to the elder's private sphere. Similarly to the traditional physical windows, the Social Window provides access to the closest social network, which is represented as a scrollable list of houses, forming a virtual neighbourhood. Availability to contact can be controlled by means of a lamp-like functionality; based on the analogy with the home lightning, the lamp can be set to: (i) "on", the lamp lights up and signals the person' availability to communicate; (ii) "busy": the lamp is grey and the person is available but busy with other activities; (iii) "off-line": the lamp is dark, and the person is not available.

Audio-video communication can be activated with the personal contacts through simple gestures performed over the list of houses, (see Figure 4).

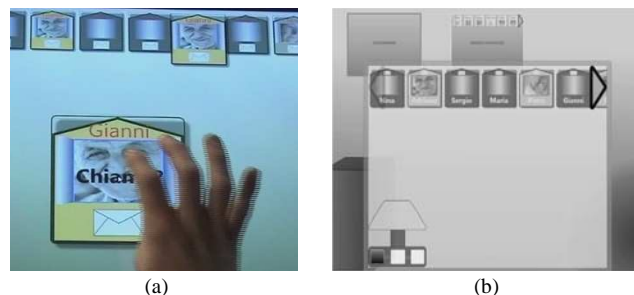(a)   (b)

Fig. 4. The Social Window: a) initiating a video-call and b) the lamp-like functionality to manage user availability exploiting the analogy with the home lightning

The *Social Window* supports also less intrusive communication through multimedia message exchanges as a way to signal the emotional closeness without the concern about invading the others' private sphere. Multimedia files can be created and exchanged by dragging digital contents over the selected contact. Incoming messages are notified through animations. These multimedia objects hold all the relevant features that make them close to gifts: (i) the persistence (they can be stored); (ii) the personalization of the form and the content; (iii) a symbolic value (e.g., use of iconic language rather than verbal or textual); (iv) the possibility of enabling an intimate but non-intrusive communication. Furthermore, multimedia objects exchange can work as stimuli to initiate conversations.

B. The Public Square – support for the public sphere

Drawing on the findings of our study, we derived the idea that of the *Public Square* as a mediating context whereby shared experience and social contacts are made possible. The *Public Square* is based on the metaphor of the place where members of local communities physically meet to share knowledge and participate in social activities. It is represented as a place where different topic containers

work as contexts conveying information and supporting social activities. Two types of contexts have been implemented: (i) containers for 'institutional' communication with (sort of News Boards): institutions and public organizations can post contents that are then promoted to the users' attention; (ii) containers designed for the sharing of digital contents: users can drag a multimedia file on the posting area of the selected topic container to make it available to other people (Figure 5).

The Public Square enables users to: a) access information and content coming from others (public institutions, other users); b) passively participate in discussions and forum-like activities; c) take part in sub-groups activities by contributing own digital content; d) collaborate with other members (games or creative activities); e) become active members by proposing activities and managing public resources by, for instance, opening new discussion topics.
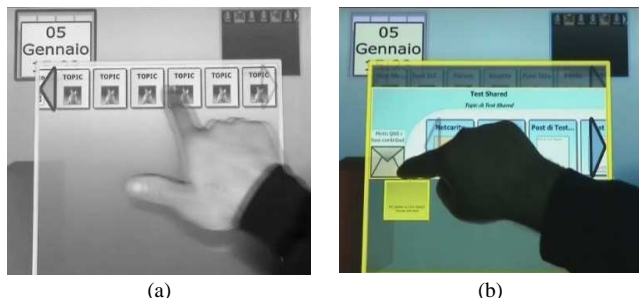

(a)   (b)

Fig. 5. The Public Square: a) scrolling the list of "containers", b) a user drags a digital content on a selected container.

The *Public Square* guarantees: (i) the possibility to enter and exit the space without explicit notification; (ii) the protection of privacy; (iii) the respect of shared norms guaranteed by a trustful subject. To secure the users' control on the boundaries between the private and the public life, (iv) information about members' status (on-line, off-line) is not displayed. Similarly the video-conferencing modality has been discarded in favour of more neutral communication modalities (e.g., the asynchronous sharing of multimedia contents and synchronous textual exchange). As it happens in other on-line forums, users are allowed to gradually become active contributors to the community.

VIII. CONCLUSIONS

Enhancing older adults' social network means first of all to address the problems of communication. At the state of the art, technology is not completely effective in supporting this task for this type of users. Based on results from studies we conducted, we have tried to clarify some of the peculiarities of older adults' communication modalities, and have identified the main barriers older people experience in initiating and sustaining relationships within their social network: the lack of definite contexts, information and guarantees. We have then proposed a new interaction solution that addressed those issues by resorting to the familiar metaphors of the Social Window and of the Public Square.

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