

DESIGNING DIGITAL PET ADOPTION SERVICES: BARRIERS AND OPPORTUNITIES FOR ITALIAN OLD ADULTS.

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ABSTRACT | Social isolation and loneliness can play an important role in Italian old adults' health. Adopting a pet could help mitigate negative health effects and could at the same time help reduce the number of animals living in shelters. Digital platforms can be a useful instrument to improve pet adoption rates thanks to matchmaking processes; however, little research has been done on verifying if old adults can effectively benefit from their use. This study follows the development of a service concept, affido, that focuses on applying a matchmaking pattern to pet adoption and support. Nine participants explored their relationships with having pets and five testers were recruited to investigate the usability of an app prototype. The qualitative interviews have highlighted the presence of fear of attachment and loss which can prevent pet adoption in particular among male old adults. The digital platform's usability scored lower than average due to a perceived lack of information as well as conflicts between common matchmaking patterns and the testers' knowledge. To become effective, digital pet adoption services should focus on including emotional issues in their narrative and may benefit from working together with old adults in reinterpreting matchmaking patterns to improve their usability.

1. Introduction

The Italian population is rapidly ageing. As of 2021, 23.5% of its population of 59.2 million people is 65 years and over (Istituto Nazionale di Statistica, 2022), and in 2050 this age group could grow to 33-36.7% (Istituto Nazionale di Statistica, 2022). Old adults are subjected to discrimination rooted in ageism (Krekula, 2009) and can become socially isolated due to their representation as socially useless, determining a negative impact on their health (Kobayashi & Steptoe, 2018). Loneliness, although not determined by isolation (de Jong Gierveld et al., 2006), can still worsen its effects (Pinquart & Sörensen, 2001) and have independent negative effects on cognitive functions (Luchetti et al., 2020) and general health (Luo et al., 2012). In Italy, old adults' social isolation and loneliness rates vary on the basis of the geographical area (Cavallero et al., 2006; Fiordelli et al., 2020).

Loneliness can also be influenced by feelings of uselessness (Aartsen & Jylhä, 2011) which can be heightened by detachment from adult children (Gu et al., 2016) and health issues preventing autonomy and social involvement (Curzio et al., 2017).

Interactions between humans and animals have been shown to be effective against loneliness (Banks & Banks, 2002; Kanamori et al., 2003; Krause-Parello, 2008) and in improving social interactions among groups (Sollami et al., 2017). Having a pet can also be beneficial to socialization as it can help old adults meet new people (Scheibeck et al., 2011) as well as satisfy their need for attachment support (Krause-Parello, 2008) in cases where communities do not exist or are difficult to develop due to physical or social barriers.

Animals in Italy experience a similar state of social abandonment to that of old adults, with an important number of animals spending their lives in shelters (Innocenti, 2019) that also have a strong impact on the economy (Ministero della Salute, 2023). Old adults could play an important role in reducing the population of animals in shelters as they may possess free time paired with high energy levels (World Health Organization, 2021) to support a pet in their lives. In Italy, only 12.1% of couples and 11% of single old adults aged 75 and over have a dog (Istituto Nazionale di Statistica, 2020), and it is unclear what the stance of Italian old adults on pet adoption is. Previous studies analyzed the pets' characteristics influence on adoption (Hawes et al., 2018; Powell et al., 2021) adopters' family status (Mondelli et al., 2004) and adoption return factors (Fatjó et al., 2015; Hawes et al., 2020; Powell et al., 2021). In cases where the adopter's age is mentioned (Shore, 2005) there was no analysis of the correlation between adoption motivation and age.

During the last decade there has been a rise in studies on digital pet adoption services. These services allow their users to put up adoption announcements and choose a pet manually (Santy et al., 2018) or by filtering through position (Magdum et al., 2023) or matchmaking processes (Allison, 2019; Davis et al., 2019). Matchmaking adoption strategies may reduce adoption drop-outs and could be perceived as useful activities if presented as a direct help to shelters (Davis et al., 2019). As of now, no study has focused on testing the usability of a match-making pattern applied to pet adoption.

Digital services may appear useless for old adults, but in Italy 60.4% of people aged 65-74 were reported having access to an internet connection, with lower adoption rates for older adults (Istituto Nazionale di Statistica, 2023). According to the Silver Economy field, old adults are a growing target for the development of new products and services (Laperche et al., 2019), a theory supported by the investment of 1,901,000 euros by Italian old adults in this sector in 2021 (Itinerari previdenziali, 2022). Nevertheless, technological products do not reach their target due to cultural, economic (Klimczuk, 2016) and social issues, as old adults perceive technology to be too difficult to use due to their age and avoid it as it heightens their interiorized ageist beliefs (Caspi et al., 2019). However, old adults navigate lower complexity platforms similarly to younger people (Ziefle & Bay, 2005) and those who use technology present better cognitive and memory functions (Benge et al., 2023; Scullin et al., 2022). One possible solution to the development of successful services could be a focus on low-technology solutions (Lipp & Peine, 2022) integrating digital and physical practices and planned with the involvement of old adults.

2. Research Questions

Based on the current research state, the main goal of this study was to individuate what are the basis for the development of a digital pet adoption service for Italian old adults as of 2023. This problem includes two main variables: Italian old adults' stance on pet adoption and their digitalization skills.

In particular, the study has been focused on these specific issues:

- What are the current trends in pet adoption among Italian old adults?
- What are the discrepancies between Italian old adults' perceived digital skills and their effective ones?
- How would a matchmaking-based adoption service fit with old adults' mental models?

The relevance of this study has been supported by the 2023 animal adoption campaign held by the municipality of Rome and directed towards old adults' communities (Roma Capitale, 2023).

3. Methodology

3.1 Data Collection Methods

The first research step was to understand how having a pet is perceived by old adults. Semi-structured phenomenological interviews were conducted with old adults residing in Rome. Nine old adults above the age of 65 ($M=75$, $SD=4,86$, age range 69 – 83), five male and four female, were recruited. Seven were recruited following a consecutive sampling method by visiting two old adults' communities, Centro Giovani Anziani Cornelia (four participants) and Centro Anziani Valcannuta (three participants). Two interviewees were recruited through word of mouth. The median length of the interview was 09:42 minutes ($SD=0,23$). Four interviews were conducted in an office located in an old adults' centre, with the president being present in the room, three interviews were held in the main hall of the centre, one was held outside a public café and one online on a Teams call, using a personal laptop. At the beginning of the interview, the participants were introduced to the research topic and gave their informed consent, agreeing to have their voice recorded.

The interview was structured to initially obtain an evaluation of the participants' current neighbourhood and a recount of a typical week in order to evaluate their social activity levels and the presence of any external barriers to socialization. After that, the participants were asked to describe their relationship with technology and if they received any help using it to investigate their digital skill levels and whether it influenced their relationships with other people. Lastly, the interviewees were inquired about current or past pets and their thoughts on the implications of having a pet and if and how they would adopt one. These questions were planned to evaluate the current adoption trends among old adults and to collect insights on the possible difficulties faced while having a pet. Additional questions were added according to the context; participants with no pets were invited to explain their refusal, whereas those with pets were asked to share their experiences with them.

The prototype of the service was designed on Figma. The usability test was open to people aged 65 or over who had to currently have a pet or have had one in the last five years and would define themselves as pet lovers. The testing phase involved five people over 65 years old ($M=71,6$, $SD= 6,11$), with one being a returning participant from the initial interviews, and the others being recruited through snowballing recruitment. Three tests were conducted in person by using a laptop with a mouse and a trackpad available, while two tests were conducted online via Google Meets. The median length of the test was 43 minutes ($SD=0,11$).

At the beginning of the test, the participants were asked three questions aimed at assessing their digital skills: “How many hours do you spend surfing the internet or using apps in a typical week?”, “Which websites and/or apps do you use the most?” and “Are there any websites or apps you particularly like or hate, and why?”.

After this phase, the participants interacted with the prototype. The moderator briefly explained the service’s options and introduced the testers to a roleplay scenario in which they had to pretend to be women interested in adopting a pet. The testers were to complete two main tasks, sending an adoption request and subscribing to a support plan while guided by a moderator. After each main task the participants were asked to take a survey hosted on Google Forms based on the Single Ease Question (SEQ) rating scale used to assess the tasks’ difficulty level (Sauro, 2012). The survey consisted of a single question measured on a 7-point Likert scale inquiring on the task execution difficulty (“How easy or difficult was the adoption process?”, “How easy or difficult was the support request process?”). At the end of the usability test the participants were asked to evaluate the prototype’s usability according to the Usability Metric for User Experience Lite (UMUX-Lite) scale, a simplified usability model derived from the UMUX scale (Schrepp et al., 2023) consisting of two statements followed by a 7-point Likert scale (“The platform’s characteristics meet my necessities”, “This platform is easy to use”).

3.2 Analysis Method

The interviews were transcribed in order to conduct a thematic analysis and highlight recurrent themes used by the interviewees. The coding processes were conducted by one author. The initial coding phase was conducted by means of an empathy map, a tool used to summarize visual information, thoughts, actions and positive and negative experiences obtained through interviews (Gibbons, 2018) that has been used as an initial deductive coding frame. The second coding phase was based on inductive coding, and its results were later re-assessed following pattern coding and thematic analysis with the objective of identifying similar experiences, highlighting diverging opinions and understanding deeper motives behind the accounts. The codes were arranged following a focused, hierarchical coding structure, with the first coding level representing the main topic, followed by the interviewee assessment and categorization of the condition (Saldaña, 2013). The information obtained through the interviews was coded individuating three main topics: current pet stance, social activity, and digital skills.

With regards to user testing, the data obtained by the initial interview was coded through a digital assessment scale used by the usability team of the UK government (Hurst, 2015). The scale is based on Go ON UK’s “Basic Digital Skills” definitions and included seven questions measured on a 4-point Likert scale, with 0 identifying no digital skills and 4 representing full control of basic digital skills. The qualitative information obtained through the interviews has been codified following the scale by converting the information into a numerical value. The testers’ digital skills were evaluated by summing together all the points and calculating the average value.

The data from the usability test has been subjected to a descriptive statistical analysis measuring the usability values of the prototype. The usability score of the prototype has been calculated by summing together the scores given by each participant to the two UMUX-Lite items, Ease of Use and Usefulness ($Q1+Q2=QA$), and then subtracting two from the initial score ($QA-1=QB$). The result has then been multiplied by 8.33 to bring it on a scale from 0 to 100 (Melissourgios, 2023). The general usability score has been obtained by summing all five UMUX-Lite scores together and calculating the average value.

It is possible to convert the UMUX-Lite score to another usability scale, the System Usability Scale (SUS) (Schrepp et al., 2023) in order to compare the scores to platforms previously analysed. The method used in this research is the one-item interpolation working only with the Ease of Use item and converting its score to a 100-point base by applying the following formula: $SUS = (Ease - 1) * (100/6)$.

4. Service Definition

A digital pet adoption service, AfFido, was designed following the information obtained through the interviews. The main functions are adoption and post-adoption support in which the service acts as a mediator between shelters for the former and trained figures for the latter. The user is matched to them through a survey and can choose to select their preferred option. The service is aimed at reducing waiting times and adoption returns thanks to the initial match-making phase, which is autonomously conducted by the user and can result in reduced workload for shelters too. The support figure can call the user or visit them in person; in the second case, the user can also have pet products be delivered to their house or receive basic vet visits at home. Further options also include sponsoring pet-based activities held at old adults' centers as well as promoting interactions between pet-loving old adults by applying once again match-making practices.

Four different personas were designed to summarize specific users for our field of analysis (Stickdorn et al., 2018). The main differentiations between them were based on diverging stances on pet adoption, combining them with compatible habits, needs and pain points.

The personas' experiences in reaching the adoption and support goals and the necessary touchpoints were summarized through means of general (Figure 1) and user-specific (Figure 2) Journeys (Stickdorn et al., 2018). Considering the varied digitalization levels of Italian old adults, a digital pet adoption service seems to benefit from being paired with in-person and call centre touchpoints. For the persona with the highest digitalization skill, the platform could be present in all steps, whereas for personas with a limited usage of technology, the platform could be introduced after the pre-service phase. For the other persona, the digital platform could be the initial touchpoint for one, whereas it could be implemented after a first introduction for the other two personas.

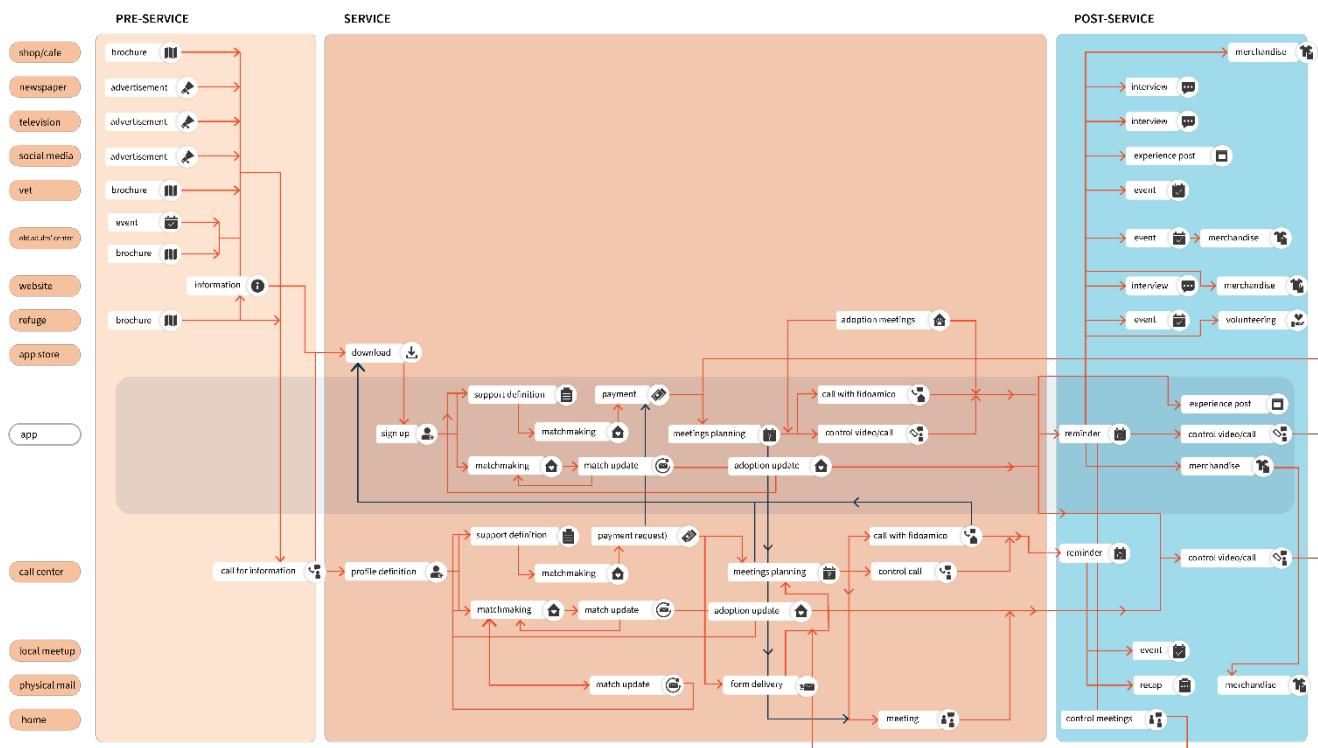


Figure 1. User Journey including all touchpoints, with a focus on digital (app) ones. The arrows in dark blue highlight conversion points from phone-based interactions to app ones.

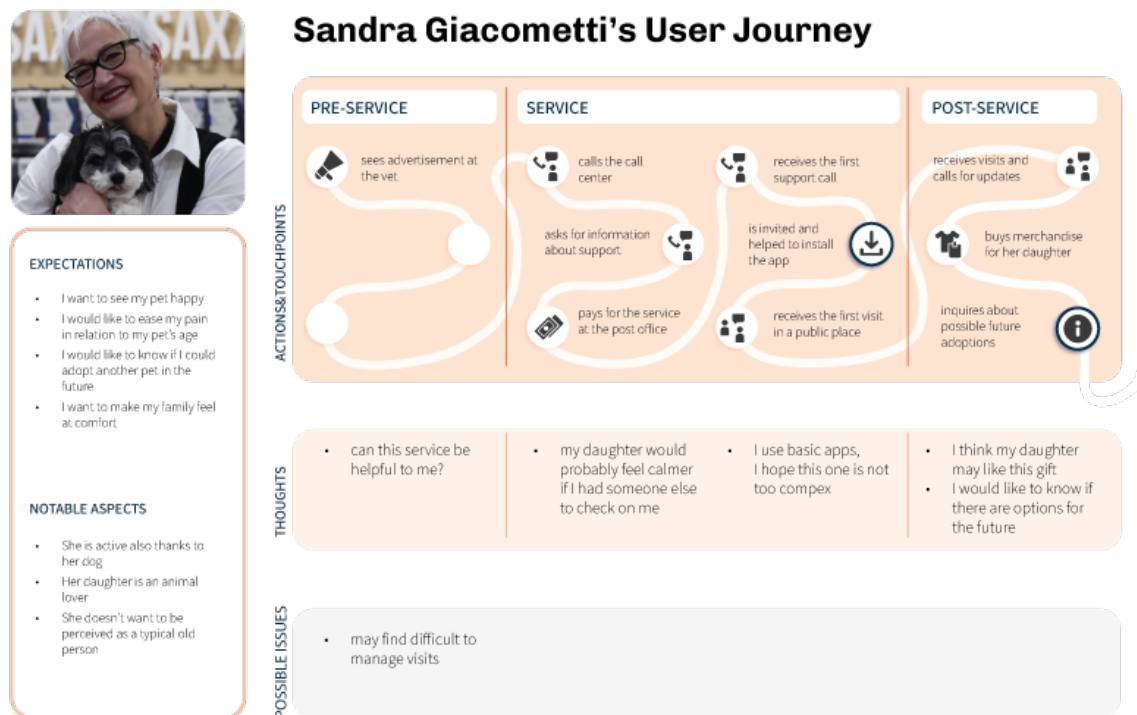


Figure 2. Persona-specific User Journey. The steps highlighted in blue represent digital touchpoints.

At the same time, a Service ecosystem was designed to highlight all the actors involved in digital and in-person interactions (Figure 3). This step was useful to understand the complexity of the general system as well as which interactions to prioritize in the development planning phase. By comparing the information obtained, persona-specific service blueprints were used to investigate the relationships between the service components and the user (Gibbons, 2017).

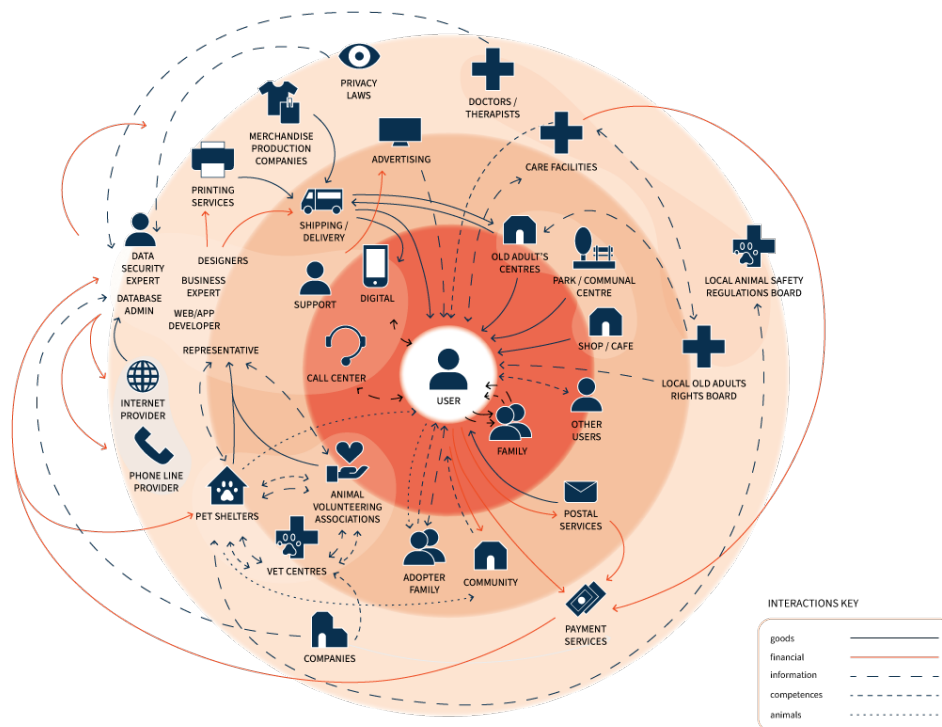


Figure 3. Visual representation of the service ecosystem.

5. Experimental Development: affido

The service's prototype was based on the analysis of two existing platforms, Petfinder (<https://www.petfinder.com>) and empethy (<https://www.empethy.it>), which both offer the possibility to take a test to be matched with compatible pets.

The digital platform was structured as a responsive design (Figure 4) to satisfy all possible device usage. The interactive prototype was presented as a tablet app that included the two matchmaking processes of finding a compatible pet and a suitable support figure; the tablet ratio was chosen as it was hypothesized that any visual issues with this phase could be encountered on smaller screens.



Figure 4. Affido's digital platform shown on different devices.

The pet matchmaking phase was ideated to include a survey followed by a list of three compatible pets (Figure 5) with the intention of testing if showing three to four items, recommended for better information retainment (Galitz, 2007), would make the process understandable to old adult users.

The prototype was designed following Web Content Accessibility Guidelines (WCAG) in their WCAG 2.0 version (Web Accessibility Initiative, 2023). The colour palette used was compliant with the success criterion 1.4.3 Contrast (Minimum) reporting that "The visual presentation of text and images of text has a contrast ratio of at least 4.5:1" (WAI, 2023). The colour orange (#F04D23) was chosen due to its ambiguous status as an accessible colour determined by worse performance over dark backgrounds (Pereira et al., 2022). The components were designed in order to be bigger than 41 mm, a measure that has defined to be accessible to people with Parkinson's (Nunes et al., 2016).

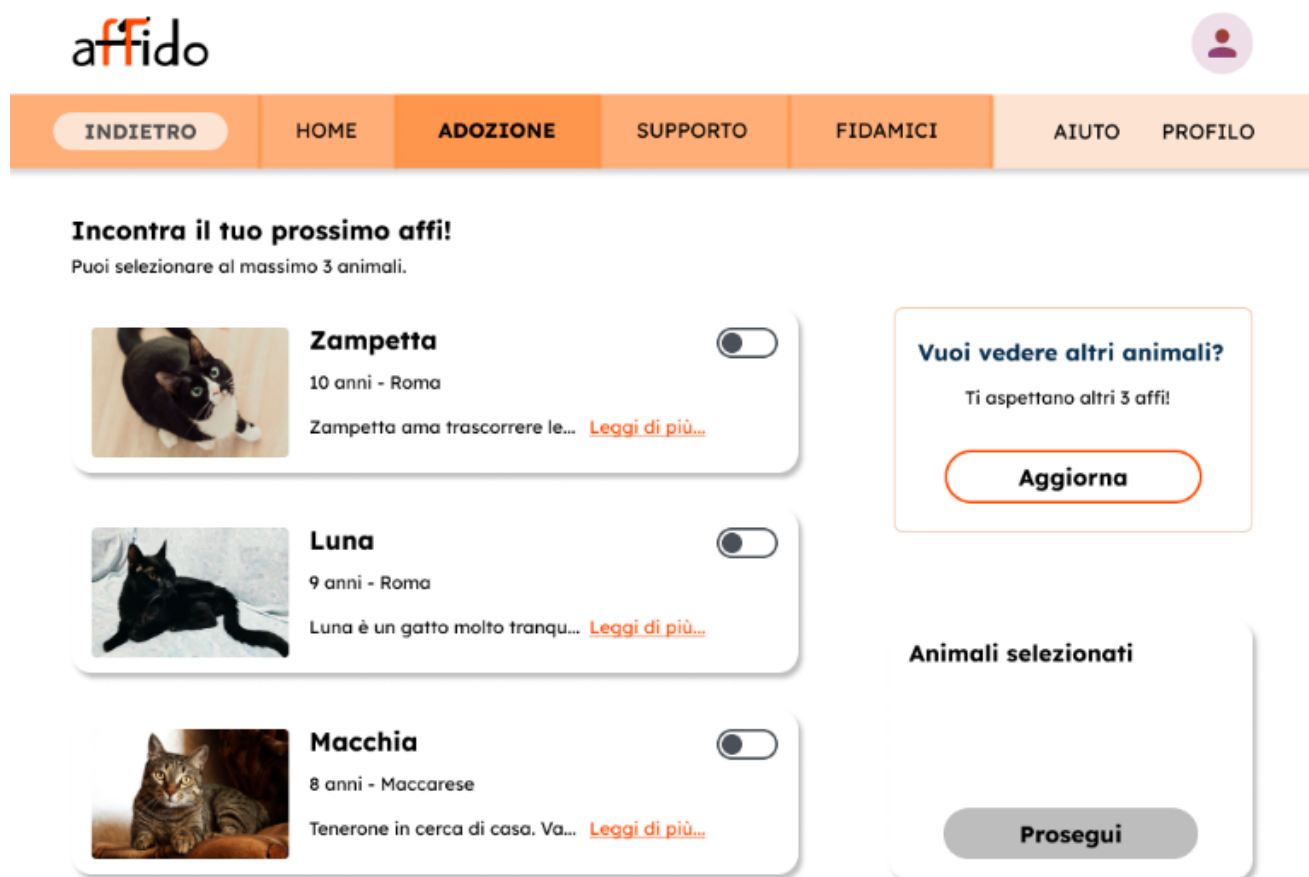


Figure 5. The pet selection page as shown on the prototype. The participants could click on the Update (*Aggiorna*) button on the top right side to show other adoptable pets.

6. Results

6.1 Interview

Four participants reported having at least a pet dog, while five did not have any pets at the moment of the interview and all but one reported not wanting one at the moment. Two interviewees personally got their pet, with one buying them and another adopting it, while the other two had it from their adult children. Seven participants had at least one pet in the past. Six participants would hypothetically adopt a pet in the future, with three expressing an interest in adopting from a pet shelter, one in buying and the other two not expressing preferences. The participants reported four main reasons not to adopt a pet (see Table 1). Three participants referenced the concept of having a pet as a family member, with two of them presenting it as a negative aspect. All male interviewees presented limits in talking about their affection towards animals, with two participants overcoming their initial fear during the interview.

When asked about their digital devices, all nine participants reported using a smartphone at a basic level, and only one used a PC. Eight interviewees indicated using WhatsApp, five Facebook and three Instagram. Two participants interpreted the word “technology” and the concept of using technological device as the usage of specific devices. Five participants made references to their past activities when talking about their relationship with technology. Eight participants admitted receiving help to use technological devices, with six participants receiving help from their adult children, two from their son-in-law, and one did not indicate any specific figure. Five participants held positive views on technology, one negative, and three were indifferent about it.

Seven participants reported attending an old people's centre. Four interviewees are caregivers; all of them help their adult children and one helps with their grandchildren. All nine participants mentioned interacting with their family or friends, with two also reporting going out alone if needed. Two participants mentioned having health issues, although only one reported them having an impact on his social life. Three participants related their physical activity to their pets.

Table 1. Participants' history of pet ownership and negative adoption stances.

| Participant | Age | Gender | Past pets | Reasons not to adopt |
|-------------|-----|--------|-----------|---|
| P1 | 65 | Male | Yes | NA |
| P2 | NA | Male | No | Lack of time, Lack of space, Not interested |
| P3 | 75 | Male | Yes | NA |
| P4 | 70 | Male | Yes | Lack of space, Fear of loss |
| P5 | NA | Female | Yes | NA |
| P6 | 74 | Female | No | Lack of time, Not interested |
| P7 | NA | Female | Yes | Not interested |
| P8 | 79 | Female | Yes | NA |
| P9 | 83 | Male | Yes | Health issues |

6.2 User Testing

The average digital skill level obtained by the five testers was of 2.93 (SD=0.73), with the minimum value of 2 and the maximum value of 3.85. The average SEQ score has been reported to be around a 5.4 value (SD=0.47) for both questions. All testers were able to complete the main tasks with only brief interruptions that were solved autonomously or with light interventions from the moderator.

For UMUX-Lite scores on the platform's usability, the average usefulness score was of 6 (SD=1) and the average ease of use score presented an average of 4.6 (SD=1.14) (Figure 6). The average UMUX-Lite score was of 71.63 (SD=8.5), with the highest score of 74.97 and the lowest of 58.31. The corresponding average SUS value was 60 (SD=16.99).

All testers encountered issues using the prototype's functions but to different degrees. Three participants mistook text for clickable elements, two struggled with dropdown menus and toggles, one did not know how to use checkboxes and three had trouble understanding written indications.

Three testers did not initially understand how to proceed with selecting the desired pets after the survey phase, but after the intervention of the moderator two of them managed to correctly interact with the prototype.

All users expressed perplexity at the words "*affi*" and "*fidaiuto*" used to identify respectively the pets and the human support figures. Three testers reported perplexity at the drawings used to represent the adoption functions, not understanding their meaning.

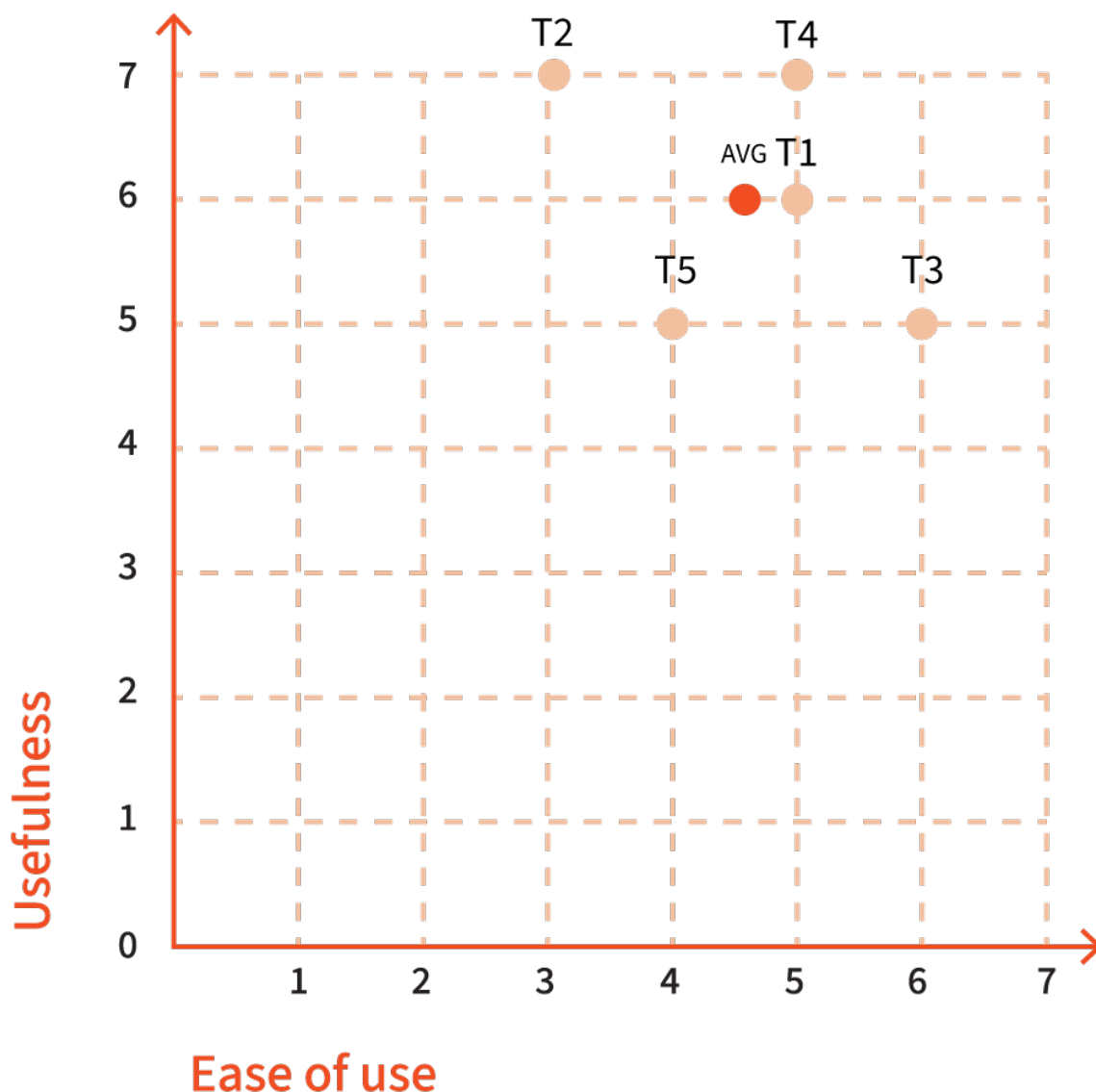


Figure 6. Scatter graph representing the relationship between the Ease of use and Usefulness scores for each test and the average score.

7. Discussion

7.1 Old Adults, Pets and Technology: An Overview

The participants presented three different stances towards pet adoption, with people who were strongly in favour of adopting a dog, people who were in doubt, and people who were against it. When asked about past experiences with animals all participants who had a pet and those who were in doubt about adopting reported having had pets that they cared about. These results are in line with observations on past pet experience being a predictor for future involvement with pets (Banks & Banks, 2002).

When it comes to disinterest in pet adoption, the participants who were strongly against it lamented the lack of space in their house as the main issue, present also among the reasons for returning or abandoning pets (Fatjó et al., 2015; Powell et al., 2021). For two participants becoming attached to the pet was a negative factor as it could interfere with their current lifestyle: “I do not want pets because they become part of the family, and since I am always out, I could not take care of them.” The participants who

expressed this view were also those who reported being active in their old adults' communities. Having a pet was also reported to be a possible source of negative feelings for P4:

“No, I don't want pets anymore because you get attached to them and you have to take care of them and – I can't do that. [...] I feel like I'm missing something, and this isn't right.”

This avoidant behaviour could be interpreted as a tendency to avoid negative emotions (Van Assche et al., 2013). It is also possible to notice the presence of underlying pet grief, which had an impact on pet owners too as they feared losing their pets: “I tremble now, as her age is significant, and every day – she's well kept, for God's sake”. The data on pet grief is compliant with reports on pet loss and its status as a form of disenfranchised grief (Brown et al., 2023), to which corresponds a difficulty in communicating about pets with other people. In fact, when talking about her pet's story, P8 commented:

“It is as if they [pets] were a family member. I know that when I say this to someone who doesn't like pets, they look at me as if I were stupid. [...] I also say silly things such as ‘Come to mom’, but if friends of mine who do not share these passions were to hear me, they would think I lost my mind.”

These comments are in line with other findings on discretion being a fundamental component to old adults with pets or experiencing pet loss grief (Brown et al., 2023). The difference between pet-havers and people who do not like them was seen as a moral failing by two pet-havers, as one of them commented: “They [people who do not want pets] are egoist [...] Taking care of a pet means being inclined to sacrifice yourself.”

It was also possible to identify different display of affection towards pets. All pet owners but one, when invited to talk about their animals, voluntarily shared emotional information of them. Participant 5 was immediately invested on talking about her pet dog, and even imitated him, while P8 preferred sharing her pet's adoption story. Participant 3 was initially detached, taking time before talking about his dog; a similar reaction was observed in P9, who waited before deciding not to talk about his late dog.

All participants who presented contradictory feelings towards pets or took time to open up about their relationship with them were male. Participant 1 presented an unexpected behaviour, as he did not report being attached to his hunt dogs, whereas participant 2, vocally against adopting pets, spontaneously recollected a time when he identified his neighbour's dog as being jealous:

“When my daughter gave me her dog and [the other dog] saw me with him, he was like this [mimicking exaggerated open eyes], he was furious, as he was jealous. I had to throw two, three biscuits to him.”

This behaviour seems to be in line with previous research on the impact of gender stereotypes on expressing emotions (Hess et al., 2000; Kelly & Hutson-Comeaux, 2000), which see men expressing sad emotional states less than women and expecting themselves to appear happier when recounting negative events, which may explain the apparent detachment from their pets. This observation is further supported by the comments of P6, who proudly stated that: “I don't have animals and I don't want them [...] I have been told ‘It's a blessing that you are not like other women’.”

One participant reported being physically active also thanks to taking her dog out and confirmed that she liked to walk and was healthy. Participant 3 used to go out with his dog but now stopped due to a leg injury. These observations are in line with former studies on the correlation between dog ownership and physical exercise (Curl et al., 2017).

Family members played a strong role in adopting a pet, as for P8 and P9 the animal had first been adopted by a younger family member and was later left to live with them, as P9 reports “I had the dog in “loan for use” from my daughter's ex-boyfriend”. For P9, the lack of in-person support and his health issues made it

impossible for him to adopt a dog: “If I had this safety [having a trusted person to take his dog out], I would obviously pay and I would have no doubts, I would immediately adopt a dog.”

With regards to technology, all but one participant admitted being helped by family members or friends to varying degrees, with most participants expecting to be helped by adult children, a finding in line with previous research (Hunsaker et al., 2019). Participant 6 recounted her smartphone usage improvement story since her son’s observations on her attitude:

“He once scolded me because I always asked him to solve my issues, and he told me that I had to learn to read instead of randomly tapping on the screen. [...] I once encountered an error, I read it and I thought to myself that I could solve it.”

The interview has confirmed the trend on smartphone usage (Itinerari previdenziali, 2022), and surprisingly no participant reported using a tablet device. The only participant who used a PC, P9, believed this skill to have helped him stay active:

“My peers are left abandoned inside their homes, they spend their time in front of the television, [I see] they aren’t motivated. I respect them but I do not agree with what they do.”

Two participants had an unexpected reaction to being asked about their relationship to technology, as they interpreted it as being able to work with complex machines, thus requiring the moderator to reword the question. More than half of them also believed that you could only possess digital skills if you had a strong interest in technology or were a young person, contradicting their own current experiences. It is possible to identify an expertise-based narrative that is in line with previous research on old adults and negative reactions to technology introduction in later stages of life (Barnard et al., 2013; Morris & Venkatesh, 2000; Selwyn et al., 2003).

7.2 Usability Test

With regards to usability scores, the prototype was classified as on the lower end of the acceptable usability level. It could be hypothesized that the scores would have been lower if the moderator had not been present, as testers commented: “I would have rated this lower if I had been alone”, “I rated it a six due to the necessity of asking for help”.

Being able to ask for help elicited different reactions in the testers, as the presence of a function to directly access the app’s help desk reassured P3, but increased P1’s frustration, leading her to comment “I don’t want to ask for help, I’m not interested in it” in a frustrated tone.

One of the main elements that impacted the usability was the perceived ambiguity of buttons and text, with the latter being mistaken as interactive and buttons being identified only after a second navigation of the interface. The difficulty in using buttons and toggles may also be related to the use of a laptop during the test, which may have been confusing for smartphone users. All five participants did not report having any sightseeing issues, but one tester struggled with reading dark blue text on an orange button; when asked if he had any issues identifying the text, he did not comment on it but was visibly distressed.

The introduction of the fragmented pet list determined mixed results. The pattern had been introduced with the objective of avoiding too many stimuli in a single page; however, the mechanism posed various issues to the testers and appeared complex to understand without a proper introduction, as one tester commented: “Did the other pets disappear?”. Other reactions included feeling upset due to the failed matchmaking, as it was considered to have not been adequately communicated during the survey. The results may be explained by the presence of significant differences in the mental models of old adults with respect to standard user testing participants.

The use of drawings turned out to not be sufficient to convey information, as most testers ignored or did not understand them. The drawings used in the prototype were more akin to flat icons' style, which has been shown to be less effective due to the absence of any references to real objects (Wu et al., 2022). The results of this study do not necessarily correlate to a lack of learning abilities and adaptability in old adults, as most participants were able to interact with unknown elements by the end of the test after receiving verbal or visual feedback. This finding is in line with previous research on the effectiveness of support in digital learning (Martínez-Alcalá et al., 2018; Pirhonen et al., 2020). During the test phase, some users commented on the options, remarking that the choices did not fit with their beliefs: "This is not my birthdate", "I would like to adopt a dog". All users also expressed perplexity at the unusual words used in the prototype, which may be due to changes in guessing abilities for unknown words determined by ageing (McGinnis & Zelinski, 2003).

8. Recommendations

When working on new services the main research step is directed towards assessing the needs and adoption barriers of potential users or stakeholders. The following recommendations are directed towards the development of services for old adults which can include topics similar to pet adoption.

1. *Hypothesize the presence of hidden emotional barriers.* A social issue can be influenced by complex factors that may go unnoticed in quantitative research. When conducting quantitative or qualitative research, consider interacting with old adults who are apparently not potential users to verify the presence of such factors.
2. *Structure interviews with emotional barriers in mind.* All interviews with male old adults were characterized by a fear of attachment expression. When interacting with old adults, it is suggestible to re-explore emotional topics after having established a safe environment, possibly by indirectly showing positive examples.
3. *Interpret the user's digital skill level.* When planning research involving digital skill evaluation, include questions identifying the extent of external help. It could be useful to identify a scale or an evaluation by specific support situations which could be defined by exploring hypothetical scenarios with the participant.
4. *Investigate the presence of different mental schemes.* When designing digital platforms for old adults it could be useful to test existing conventions by subjecting them to new, older or non-expert users to highlight issues that may have been accepted by habitual users.
5. *Consider polarizing factors in the user testing narrative.* Pretending to adopt a cat when loving dogs can be a distracting element to testers. If it is fundamental to include such elements, collect the participants' preferences through pre-test surveys to plan roleplay activities which accommodate their inclinations.
6. *Design tailored onboarding experiences.* Old adults can be frustrated when offered unneeded support. Future onboarding practices could assess the users' needs through a survey or on-demand help in order to allow old adults to retain their independence and help platforms include multiple user typologies.

9. Limitations and Future Directions

The generalizability of the results has been limited by the restricted pool of testers. Further studies could focus on quantitative research to validate the extension of the reported experiences in Italy.

It is possible to observe how former studies on pet ownership analysed a general population (Albright et al., 2022; Pikhartova et al., 2014), women (Krause-Parello, 2012; Ory & Goldberg, 1983; Watson & Weinstein, 1993; Zasloff & Kidd, 1994) or explicitly admitted not finding many male pet owners (Brown et al., 2023).

Considering the restricted number of participants in this study, future research could explore the relationship between current male pet owners and their pets and investigate any positive or negative patterns to consider in future interventions.

To further support the development of pet adoption interventions with old adults, future research could define the current interest in using digital solutions and receiving in-person and online support among this demographic.

With regards to usability, the findings of this research could be corroborated by quantitative tests defining the incidence of communication issues and pattern incompatibility here reported. The matchmaking pattern could be reinterpreted by finding a compromise between a list and a curated view, without limiting the user's actions. Further research should analyse the discrepancies between younger adults and older adults with high digital skills in order to highlight any usability and accessibility issues that may go overlooked due to mental schemes adapted to existing solutions.

10. Conclusions

Pet adoption from old adults is promoted by evidence of its positive impact on loneliness, but it is not widespread in Italy (ISTAT, 2020). Along with typical issues such as lack of space and free time, Italian old adults may refrain from adopting pets due to fear of loss and, for male old adults in particular, a general fear of emotional attachment. It is also possible to highlight the presence of two distinct groups of old adults, with pet-loving ones feeling detached from people disinterested in pets. The results of this study suggest taking into account the role played by emotional and social issues when designing services aimed at interventions with animals or other polarizing elements.

With regard to digitalization, the majority of participants reported using digital devices and platforms. Regardless of their abilities, all participants considered human support as an essential aspect of their abilities, suggesting the need for a reinterpretation of digital skill assessment in old adults. Matchmaking-based digital services can be an accessible option to find an adoptable pet for old adults if paired with sufficient information and onboarding sessions tailored to different digital skill levels. The interaction with the prototype of a digital pet adoption platform has highlighted the contribution determined by onboarding issues in discouraging old adults in their approach towards technology. Testing established patterns and elements with users from pre-internet generations may help identify areas of improvement and optimization which could simplify their usage for all.

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