Design of a Collective Intelligence Platform for Facilitating the Silver Economy: An Exhaustive User-Centered Evaluation

Sidra Azmat Butt [1], Shweta Suran [2], ingrid pappel [2], Marina Weck [2], and Dirk Draheim [2]

[1]Tallinn University of Technology
[2]Affiliation not available

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Abstract

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Sidra Azmat Butt[1*], Shweta Suran[1,4], Ingrid Pappel[2], Marina Weck[3], Dirk Draheim[1]

[1*]Information Systems Group, Tallinn University of Technology, Akadeemia tee 15a, Tallinn, 12618, Estonia.
[2]Next Gen Digital State Research Group, Tallinn University of Technology, Akadeemia tee 15a, Tallinn, 12618, Estonia.
[3]HAMK Smart Research Unit, Häme University of Applied Sciences, Vankanlähde 9, Hämeenlinna, 13100, Finland.
[4]Knowledge Media Institute, The Open University, Walton Hall, Milton Keynes, MK7 6AA, United Kingdom.

*Corresponding author(s). E-mail(s): sidra.butt@taltech.ee;
Contributing authors: shweta@taltech.ee; ingrid.pappel@taltech.ee;
marina.weck@hamk.fi; dirk.draheim@taltech.ee;

Abstract

As the size of the silver generation grows, the demographic shift poses both challenges and opportunities in embracing innovation and technology. This study delves into the challenges and barriers faced by the silver generation when using digital platforms. It focuses on a collective intelligence platform, the Digital Silver Hub, and two age groups of older adults within the silver generation: adults aged 55 to 65 and those aged 65 and over. Semi-structured interviews were conducted with representatives of both age groups from the Baltic Sea Region. Thematic analysis results revealed challenges faced by each group, their expectations from the Digital Silver Hub, the importance of a user-friendly interface, concerns about data privacy and security, and the potential impacts of the platform. The research findings emphasize the importance of adopting a user-centric evaluation when designing the platform. The recommendations generated from this study can guide the development of user-friendly solutions, empowering and enriching the lives of the silver generation in our increasingly digitalized world.

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1 Introduction

In the present century, demographic change has led to a higher population of the silver generation in societies all around the globe, including the European Union (EU). This change in population demographics has been explained as modifications in the age structure based on improvements in their living circumstances [1]. While this demographic change is affecting the entire global population, it is more evident in the developed areas of the world like Europe and North America [2]. Between 2019 and 2100, the number of old-age adults (those aged 80 years or above) is expected to increase from 5.8% of the population to 14.6% [3]. Gordon termed the silver economy the third-largest economy in the world after the United States and China, which holds massive opportunities for both the public and private sectors [4]. Therefore, it creates a wide scope of possibilities for policymakers and entrepreneurs to capitalize on the untapped potential of this emerging market.

As society shifts from an industrial to a digital nature, the technology landscape also evolves rapidly. Developed economies like the EU face a decreasing ratio of working-age citizens to retirees, which means the best path forward is to take advantage of the opportunities created by technology [5]. Information and Communication Technology (ICT) can be utilized to meet the needs of the aging silver generation; therefore, several digital and assistive technologies have been developed to open up new avenues for providing innovative solutions to improve the quality of life for the silver generation [6, 7]. The concept of smart aging is also gaining popularity because of its benefits, such as improved well-being and increased independence, consequently leading to lower healthcare costs [8]. Another example is City 5.0 which is a citizen-centric approach to city design, recognizing their role in shaping and providing services [9]. This approach is particularly important for the silver generation, as they often face obstacles and difficulties when trying to access services provided by the city. However, many existing solutions overlook the specific needs and preferences of different age groups within the silver generation, leading to usability issues and limited adoption [10–12]. In today's era, digital platforms have become increasingly significant for the silver generation [13]. They enable citizens to participate in different facets of life and maintain connections with their loved ones, regardless of distance. Whether it involves having video calls with family members, purchasing groceries, or even utilizing social media networks to reconnect with old acquaintances, these technological resources have expanded the horizons of the silver generation in countless ways [13]. However, these platforms are not without their challenges and limitations. While they offer potential, they also come with obstacles that require consideration and strategic solutions [14–16]. It is crucial to navigate these complexities in order to fully realize the benefits of platforms for meeting the needs of older adults [17]. Furthermore, it is essential to recognize that the silver generation includes different age groups, and

they have distinct needs [18, 19]. These differences highlight the significance of tailored solutions that take into account the nuances within these age groups [20]. Acknowledging these varying needs and enhancing end-user involvement in the development process [9], along with an understanding of the challenges and possibilities at hand, becomes the first step towards paving a transformative path forward in enriching the lives of the silver generation.

The research paper aims to present a user-centric evaluation [21] to designing and developing a collective intelligence (CI) platform, Digital Silver Hub (DSH), that specifically addresses the challenges and barriers faced by the silver generation. This study focuses on two groups of older adults within the silver generation: adults aged 55-65 years old and those aged 65 and above. Therefore, the research question is: *How can the CI platform effectively address and mitigate common barriers and challenges for older adults by soliciting feedback from both age groups?*

The DSH platform, created under the EU Interreg Baltic Sea Region (BSR) OSIRIS project[1], acts as an ecosystem for innovation stakeholders, fostering the development and rapid adoption of innovative solutions addressing the challenges encountered by the older adults and facilitating their active and independent living. The DSH stakeholders represent innovation actors of the quadruple innovation helix model, Quadruple Helix (QH), which is a concept emphasizing broad collaboration in innovation between government, academia, industry, and civil society [22] represented by older adults. The DSH adopts the user-centric evaluation to drive and refine the design of the platform [21]. The user-centric evaluation ensures that such digital platforms effectively cater to the needs and preferences of the target stakeholders [23]. In this case, it is even more crucial to adopt a user-centric evaluation as the target user group represents the silver generation who have distinct characteristics and challenges. This study acknowledges the diverse expertise of the silver generation, and the designed DSH empowers them as co-creators by incorporating their valuable feedback and insights to help uncover barriers that otherwise may go unnoticed. In addition, the user-centric evaluation approach provides a perspective that also helps enhance user satisfaction and increase the technology adoption of the silver generation [21].

This study holds significant importance as it has the potential to contribute towards developing user-centered digital solutions that cater specifically to the unique needs and challenges faced by older adults. By integrating principles from ISO 9241-210 into the research process, we can ensure that the design and implementation of the CI platform adhere to recognized standards in human-centered design. This not only adds credibility to the research findings but also enhances their reliability and trustworthiness.

We proceed with the paper as follows. In Sect. 2, we conduct a literature review in regard of digital platforms for the silver generation and their user-centric evaluation. In Sect. 3, we describe the research methodology of the study. In Sect. 4, we provide a description of the Digital Silver Hub system. In Sect. 5, we report the results. In Sect. 6, we conduct a discussion on theoretical and practical implications, future work, and limitations. We finish the paper with a conclusion in Sect. 7.

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[1] https://osiris-smartsilvereconomy.eu/about-project/

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2 Literature Review

2.1 Digital Platforms for the Silver Generation

According to Bran et al., the idea of industrialized economies around the globe constituting a growing population of older adults is not new [24]. However, it was not until the last decade of the 20th century that the dramatic increase in the number of aging population was truly acknowledged. Eatock claims that the concept of the silver economy gained popularity after the European Commission's paper on population aging in 2015 [25]. Grundy and Murphy define population aging as the *"process leading to the increase in the representation of older people in the total population"* [26]. Klimczuk identified population ageing as *"an increase in the length of human life"* [27]. He suggested that this has led to the interest in developing goods and services for older adult consumers and, hence, the concept of a silver economy [27]. ICT has played a vital role in helping the silver economy achieve digital inclusion as the aging population may perceive that digital technologies are valuable, makes them self-efficient and also fulfill their needs[2]. This has eventually led to more digital and ICT-based platforms and eventually revolutionized the way people socialize, search for information, and avail services [28]. Digital platforms can be considered a one-size-fits-all solution because of the flexibility and dynamicity of the platforms that they can be used for any product and service [29].

Boudreau and Hagiu elaborate on the significance of a multi-sided digital platform that allows interactions from different user groups, enabling knowledge exchange and collaboration [30]. The value created through these platforms is interdependent on the size of the group, where one group gains value when the size of the other group enlarges [31]. According to Ardolino et al., the infrastructure of such platforms should be designed in a way that allows two-way interaction as well as the transaction between the user groups; however, this is only possible when ICT is in place [32]. ICT allows online communication; therefore, devices like mobile phones, the internet, laptops, tablets, etc., are imperative for the platform to fulfill its function [33]. In order to foster user involvement, online communication tools are required to organize communication and interaction, which eventually also help in collecting data that helps streamline users' preferences and efficient use of resources [34]. For this study, we use the definition by Staub et al. as they defined the digital platform as a *"software-based system that: a) consists of a modular technological architecture, b) coordinates external actors that innovate and/or compete and c) can function as a central hub of an ecosystem, in which peripheral firms or individuals facilitate, complement and are connected via boundary resources"* [35].

There are several notable digital platforms now available that help older adults in their daily routines [36? , 37]. These platforms provide opportunities for older adults to build social connections [38], reduce isolation, access information, and avail of different services related to healthcare, housing, transport, leisure, and more. A list of some of the existing digital platforms with their functions is given below (Table 1).

While there are so many digital platforms and e-services available for the silver generation, there are some gaps and limitations that need to be considered [14–16, 39].

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[2]https://ec.europa.eu/info/sites/default/files/1_en_act_part1_v8_0.pdf

Table 1 Existing Digital Platforms and Their Functions.

Platform	Function
AARP	A nonprofit organization that provides resources, advocacy, and community support for older adults in America.
Age UK	A charity in the United Kingdom that offers information, advice, and services to support older individuals and their caregivers.
Silver Line	A helpline in the UK that provides a 24/7 telephone service for older people seeking support, advice, or simply a friendly conversation.
Senior Planet	An organization that offers technology training and workshops to help older adults navigate the digital world and stay connected.
Elder Wisdom	An online platform where older adults provide advice, support, and wisdom to younger individuals who seek guidance.
SeniorNet	An international organization with chapters in various countries, including the Baltic Sea Region. They offer computer training, digital literacy programs, and support for older adults to enhance their digital skills and engage with technology.
AgingCare	An online community and resource platform offering information, support groups, and caregiving resources for families caring for aging loved ones.
60 and Me	A website and community created by Margaret Manning, offering inspiration, resources, and advice for women over 60.
Evermore	A platform that aims to redefine aging and offers resources, services, and communities for older adults to live purposeful lives.
Elder Orphan	A Facebook community that connects seniors who are aging without support from immediate family members.
Silvernest	A home-sharing platform that connects aging homeowners with compatible housemates, promoting inter-generational living and addressing housing challenges for older adults.
Aging Analytics	An organization that applies collective intelligence and data-driven analysis to understand the biology of aging and develop interventions for healthy aging.
Active Aging 2.0	An initiative that aims to enhance active and healthy aging by leveraging digital technologies and collective intelligence. It promotes collaboration among stakeholders in the Baltic Sea Region to develop and implement innovative solutions for older adults.
Senior Academy	An educational platform that offers learning opportunities for seniors in the Baltic Sea Region. It provides a collaborative environment where seniors can share knowledge, skills, and experiences with each other.
Gubbe	An online platform for home-care services for seniors that employs the young and encourages active aging.
VideoVisit	A software that supports remote care for seniors by incorporating digital visits into their nursing care plans.
Fiksari	A technology startup in Finland that aims to make the lives of seniors more technology-fluent.

Some digital platforms do not cater to the accessibility issues e.g. small font sizes or confusing navigations that could limit the ability of older adults to fully use the functionalities [40]. Moreover, the silver generation has diverse needs, especially among the two age groups: older adults aged 55-65 and those aged 65 and over [18]. They may have varying health conditions, cultural backgrounds, social influence, motivation to engage digitally, and technology literacy [17], which needs to be accounted for when developing solutions for this population segment and therefore lack personalized experience [41]. Most of the solutions lack offline support, which should be integrated to

enhance the effectiveness of the solutions for the silver generation [42]. In addition, some platforms do not offer privacy, security, and trust, and therefore, the silver generation finds it challenging to use the platform with full confidence [43]. Digital platforms for the silver generation should be designed using the user-centric evaluation approach [44]. Digital platforms should address barriers that the aging population faces, such as age-related physical and cognitive impairments, digital literacy issues, accessibility problems, and social isolation [45]. Therefore, there is still room for improvement in terms of user-centric design, addressing barriers, and ensuring inclusion across different groups of the silver generation. These platforms should be dynamic and continuously adapt to the rapidly evolving technology; therefore, these platforms should seek user input and improve based on user feedback and changing needs [46].

2.2 Differentiating Needs of Older Adults

As the aging population grows and the technology landscape evolves, digital platforms have gained immense popularity [13]. However, for these platforms to be effective, it is imperative to understand the diverse needs and challenges of the silver generation. According to the United Nations, individuals aged 60 years or older are considered to be older persons [47]. However, different organizations have categorized the silver generation into three groups: the "young-old" (ages 60-75), the "old-old" (ages 75-85), and the "very old" (ages over 85) [48]. The research community also varies in their perspectives on defining this age group. Some consider individuals over 65 as older people [49, 50], while others regard those over 60 years as elders [51–53]. Additionally, different researchers define the elderly differently, with some defining it as individuals above the age of 55 [54–56], while others consider those aged over 50 to be elderly people [57, 58]. For the purpose of this study, we have defined two groups within the silver generation: older adults aged 55 to 65 and those aged 65 and over [18]. These two age groups have distinct characteristics, requirements, and challenges that must be addressed when designing a platform for the silver economy.

Older adults aged 55 to 65, also referred to as 'pre-retirees', are more familiar with technology and digital solutions because of growing up in the digital era [59]. They have an active lifestyle and mostly understand the importance of using technology in their everyday lives. They are socially more active and are generally proactive in maintaining their well-being. They are familiar with smartphones, laptops, tablets, and even online services [60]. However, adults aged 55 to 65 face barriers to technology adoption, especially in their careers. While the younger generation and technology replace most job positions, it becomes difficult to catch up with the changing work environment [61]. As more and more AI-assisted tools and digital platforms are introduced in the workplace, adults aged 55 to 65 may show some resistance to change [62]. Although these adults are better at using and adopting technology, not all individuals in this age group have the same level of digital literacy [63]. Therefore, adults aged 55 to 65 may also require intuitive, user-friendly designs and training when introducing new systems. Also, when adults aged 55 to 65 retire and seek opportunities, similar platforms for job searching they used earlier might not be so helpful [64]. Most job-seeking platforms focus on career development and networking opportunities; however,

older adults aged 55 to 65 may need to look for opportunities for re-skilling, online learning, or freelancing jobs after retirement [65].

Older adults aged 55 to 65 are usually health conscious and focus on fitness; however, some may start facing initial signs of age-related health problems and may require specific lifestyle changes [66]. On the one hand, this age group may require platforms for fitness and nutrition, but on the other hand, they may also require services for managing chronic health issues. Moreover, older adults aged 55 to 65 are socially connected and engage in professional or recreational activities. Digital platforms also assist them in finding like-minded people and connecting to friends; therefore, platforms should be designed to address their need for community-building and networking [67]. However, stress management can still be an issue for this age group, with depression and anxiety disorders being the primary cause. It is identified that adults aged 55 to 65 can diagnose such mental health problems at an early stage and prevent them [68].

On the other hand, older adults aged 65 and over are even more diverse, with varying needs and experience with technology [69]. They face different barriers to technology adoption, such as physical challenges, acceptance barriers, technology literacy, technology usability, data management and privacy, and lack of access [70]. Many older adults aged 65 and over may have changes in skills as they age, such as changes in motor, cognitive, or sensory abilities [71]. As individuals age, their motor skills may decline, resulting in slower response times and significant variability in movement. Diseases such as arthritis may lead to swellings and further reduce the accuracy of using smart devices [71]. Declining motor skills also affect the ability to use input devices like the mouse; therefore, touchscreens are more feasible [72]. In addition, cognitive skills such as low memory capacity and less attention span and sensory skills such as vision and hearing impairments are significant challenges for this age group to adopt the technology [71]. Older adults aged 65 and over may also face mental health disorders, and it was found that detection and treatment rates amongst older adults remain low [68]. This leads to lower technology usability, and often, older adults find technology difficult to use and navigate. Small fonts, multiple buttons, and complex instructions hinder older adults from adopting the technology [70].

Compared to older adults aged 55-65, those aged 65 and over are less confident when using technology. Although older adults aged 65 and over accept the benefits of technology and are more interested in innovative solutions to help improve their quality of life, they are willing to spend on them, too [73]. Older adults aged 65 and over have a limited knowledge base and lower self-efficacy towards using technology. They constantly fear making mistakes, making them unlikely to use more than one technological solution [74]. Another concern for older adults is the social isolation that develops at their retirement age and consequently leads to health degradation [75]. Many social network services remain unusable as older adults aged 65 and over do not understand how those services can benefit them; they have problems with privacy, the interface is complex, complicated jargon is used, or they have no access to smart devices or the internet [76]. Moreover, Studies have found that lack of access to technology and infrastructure can be a significant barrier to ICT adoption for older adults aged 65 and over [77, 78]. This includes a lack of access to computers, the internet, and digital devices, as well as to training [79], support, and easy access helplines [80]. In addition,

privacy and security are equally important concerns for both groups of older adults. Studies identified that if clear and transparent information about data collection and usage is not provided, it will most likely raise privacy concerns and lead to lower technology adoption [78, 81, 82]. Those services or platforms that provide feedback as a return on the value of data collected from older adults can increase their trust and understanding of technology [80].

2.3 User-Centric Evaluation in Addressing Barriers for the Silver Generation

Literature suggests that the key to effective product design for older adults is the users themselves [83]. However, designing products for older adults is a multifaceted task as it focuses on different factors such as their mental capabilities, the social and physical environment [84] and how much they are 'digitally marginalized' (i.e., "people who lack the skills or the access to developing skills for using the internet" [85]. Due to these factors, older adults aged 65 and over are frequently considered technically less ingenious than those aged 55-65 [86]. Thus, companies tend to develop products (systems or platforms) primarily for older adults aged 55-65 with complex features and options, such as newly implemented digital solutions during the COVID-19 crisis [87]; consequently, older adults aged 60 and over were not able to utilize such solutions. In order to enable all older adults to use the applications of web platforms, it is necessary to involve them in the early stage of the platform development process. Besides this, platforms for silver generation like Grandfolk[3], American Association of Retired Persons (AARP) [88], Suddenly Senior[4], ElderTreks [89], Seniors Only Club[5] and SeniorChatz[6] are quite popular but designing and development of such platforms are missing in scientific literature. Thus, it becomes crucial to investigate the underlying architecture of such platforms.

Furthermore, studies also stated that user interfaces of online platforms are not tailored according to the needs of two groups of the silver generation, thus resulting in frequent design modifications [90–93]. As a result, the silver generation is not able to utilize the platform appropriately and effectively [94] for accessing crucial services such as acquiring updated information about new policies, staying connected to friends for mental and social support, and accessing health services [93]. The main challenge in tackling such issues is to collect all relevant information from the silver generation, understand it, and effectively incorporate it into the design process. In the past few years, several approaches have been used to support the effective designing and development of crowd-oriented platforms for the silver generation, including inclusive design [95], universal design [96], user-centric design (UCD) [97], human-centered design [98], and equity-focused design [99]. Among them, user-centric design is always considered to be the most suitable as it specifically focuses on users and their requirements in every stage of the design process [100, 101]. UCD also provides different methods (like interviews, usability testing, scenario-based design, and participatory

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[3]https://grandfolk.com/
[4]https://www.suddenlysenior.com/
[5]http://www.seniorsonly.club/
[6]https://www.seniorchatz.com/

design), tools (like prototypes and personas), guidelines (like universal design), and standards (like DIN 33402-2 and ISO) that enhance the requirement elicitation process [94] (see Table 2). With respect to older adults, UCD methods are considered crucial for the design of systems as they create solutions in stages where all features of the system are shaped in such a way that is easy to understand and use and evaluate the final solution with real-time users. Studies have found that poor system design choices that do not include the silver requirements are a key obstacle to performing essential activities [102–104]. Thus, it is essential to use different UCD approaches and international standards to build solutions that are easily and effectively used by our aging society.

Furthermore, ISO 9241-210 principles of the human-centered approach is the most suitable standard for user-centered design as it provides 7 principles (i.e., " suitability for the task, self-descriptiveness, conformity with user expectations, suitability for learning, controllability, error tolerance and suitability for individualization" [21]) for designing user interactive systems to make systems more serviceable by employing human factors and usability knowledge. Finally, user-centric evaluation is always considered a crucial process to find limitations, new requirements, future challenges, and the effectiveness of a system. Throughout the design process, system designers and developers take feedback on their products to gather information about how users interact with their designs, which components or features are intuitive, effective, challenging, and problematic, and what new modifications they want [21]. This feedback is used to improve the designs and ensure that the system fulfills all the needs of its users. By doing this, designers ensure that they are providing the best user experience and persistently improving their design [21].

3 Research Design

The qualitative research methodology was used for the study as the primary feature of this method is its flexibility to incorporate varying "world-views" of the actors involved [109]. Bryman associated qualitative research with "*participant observation, semi- and unstructured interviewing, focus groups, the qualitative examination of texts, and various language-based techniques like conversation and discourse analysis*" [110]. This research is part of the design science [111, 112] efforts conducted by OSIRIS - 'Supporting the Smart Specialization Approach in the Silver Economy to Increase Regional Innovation Capacity and Sustainable Growth'[7], an EU-funded project that responds to the changing needs of the silver generation of the BSR.

3.1 Participant Selection and Data Collection

For this research, qualitative data was collected with informed consent through interviews with 20 participants. These participants include the silver generation, divided into two groups: older adults aged 55-65 and those aged 65 and over. 10 participants were in the age group of 55-65, while the other 10 were aged 65 and above. The participants were from the six regions of the BSR: Denmark, Estonia, Finland, Latvia, Lithuania, and Russia (St. Petersburg). Purposive sampling was conducted to select

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[7]https://osiris-smartsilvereconomy.eu/about-project/

Table 2 Different Types of UCD Methods.

| Approach	Use-case	Some characteristics
Focus groups [105]	Requirements elicitation	●Utilize to obtain various perspectives, thoughts, or opinions on a certain topic. ●It is essential to have a skilled moderator, facilitator, or researcher. ●This can be done with a small sample size. ●Mainly produce qualitative data.
Questionnaires and surveys [106]	Requirements elicitation & evaluation	●Use to acquire large amounts of statistical data about particular requests or challenges by asking a pre-defined set of questions. ●Questions should be straightforward, real, and unbiased. ●Require a large sample size. ●Generate qualitative and quantitative data.
Interviews [83]	Requirements elicitation & evaluation	●Use in the early phases of the design process and provide in-depth information with respect to individual behaviour and needs. ●Need a knowledgeable interviewer. ●Different approaches are used to analyse answers. ●Mainly produce qualitative data. ●This can be done with a small sample size.
Usability testing [107]	Design & evaluation	●Primarily used to uncover digital accessibility and service-ability problems. ●Allow users to interact with the prototype of the system in a live environment while the moderator, facilitator, or researcher takes notes. ●Generate qualitative and quantitative data. ●This can be done with a medium-small sample size.
Card sorting [108]	Design	●Mainly used to examine and design the whole architecture of a system. ●The results of card sorting are used for suggesting intuitive classes and provide insights into how users feel about the system. ●Mainly produce quantitative data. ●This can be done with a medium-small sample size.
Participatory design [94]	Design	●Allow users to be actively involved in the creation of archetypes and decision-making processes. ●Design sessions require a moderator, facilitator, or researcher with an in-depth understanding of the respective area. ●Mainly produce qualitative data. ●This can be done with a small sample size.

the participants to ensure that diversity in terms of gender, age, social and economic background, and technological proficiency is represented [113]. This allowed a comprehensive understanding of the needs and preferences of older adults by capturing a wide range of perspectives and experiences.

Semi-structured interviews with open-ended questions were conducted, and the individuals could expand on their responses. Interviews were, on average, 1 hour long. The interview with each participant was conducted in two parts, with the first part including a discussion about different barriers and challenges they face when adopting

and using the technology. The second part involved showing the platform mockups, user dialogue models in terms of a form-oriented dialogue model [114–116] developed utilizing the Unified Modelling Language (UML), scenarios, and customer journeys [117], and web implementation of the SilverHub Platform[8] to the participants to provide a visual representation of the functionalities and features of the DSH. The participants then discussed the possible ways the DSH can help overcome some of the challenges they face, provided their feedback, gave suggestions, and provided valuable insights to the DSH.

3.2 Data Analysis

The data collected from the interviews were then transcribed, and a tool-based thematic analysis was conducted. Thematic analysis is a qualitative data analysis method that seeks to identify and categorize common or shared meanings within the given data [118]. Inductive analysis was conducted, and NVivo was used to generate codes and themes (Fig. 1). NVivo is a software tool created by QSR international for qualitative data analysis and facilitates researchers to classify, interpret, and analyze large amounts of unstructured non-numerical data [119].
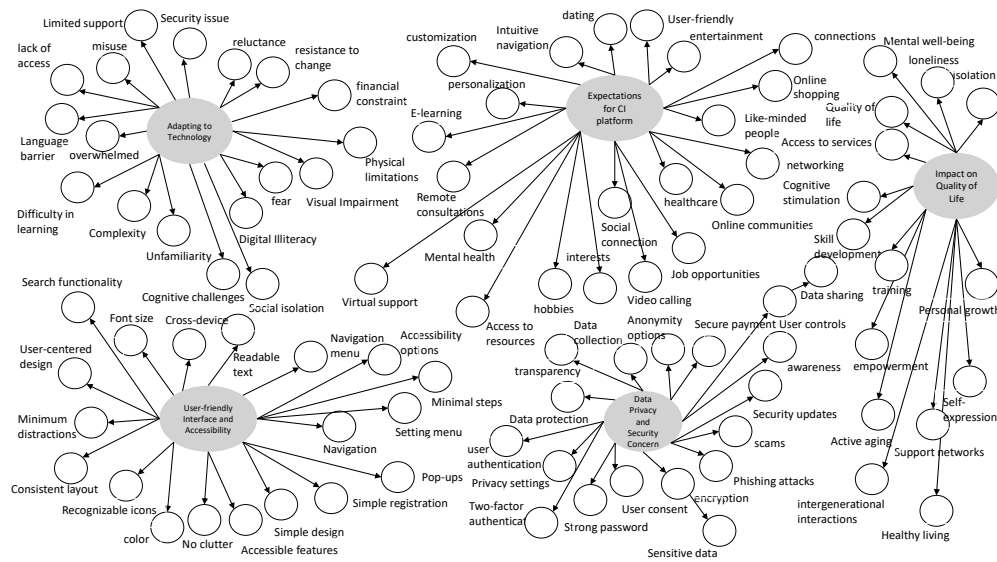
Fig. 1 Thematic map of the conducted interviews.

3.3 Integration of ISO 9241-210 Principles

The qualitative research methodology of the study seamlessly integrated the principles outlined in ISO 9241-210 [21]. These principles act as a guide for designing systems that

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[8]https://silverhub.eu/

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prioritize the needs of users and align with industry standards. The study incorporated the following principles into its research process:

1. Understanding Users, Tasks, and Environments: The study ensured that the platform and its functionalities were designed based on an understanding of user requirements, tasks, and the context in which they will be used. This understanding played a crucial role in participant selection and data collection.
2. Involving Users Throughout Design and Development: The study actively engaged users throughout the research process by seeking their input, collecting data from them, and integrating their feedback.
3. User-Centered Evaluation and Iteration: The study recognized the nature of design by incorporating user feedback to refine solutions and address any issues.
4. Considering the Entire User Experience: The research methodology took into account broader user experience beyond usability, including factors like support, training, and how users interacted with the system.
5. Multidisciplinary Design Team: The approach acknowledged the significance of a team with expertise and viewpoints working together to jointly create and build solutions that meet the requirements of a wide range of user groups. The team included subject matter experts, developers, UX designers, and quadruple helix actors from the six regions of the BSR.

By integrating these principles, the research approach guaranteed that the results of the study adhered to recognized standards in human-centered design for creating user-centric interactive systems, adding to the trustworthiness and reliability of the research findings.

4 System Description

The functionalities of the DSH are designed based on the components of a generic CI model [120], which include staffing, processes, goals, and motivation. The DSH platform is a collaborative space for various stakeholders and innovation actors, including private sector representatives, academicians, policymakers, and older adults. The success of the platform depends on the quadruple helix actors utilizing it effectively, with policymakers playing a crucial role in delivering public value, engaging older adults, identifying market gaps, and enhancing collaborative innovation in public administration [121]. older adults' participation is equally important as consultants on senior needs, and their contribution to developing innovative solutions on the platform is highly valued. Stakeholders can participate by sharing innovative ideas, discussing the feasibility of ideas, organizing training programs, and providing networks for collaboration. [122]

To measure the platform's success, it is crucial to have loyal users, regularly updated content, and successful collaborations. Social interaction is key, and integrated systems such as Zoom, Skype, and Teams facilitate smooth collaboration between innovation actors. Social media platforms like LinkedIn and Facebook can also be utilized to channel networking and build public relations. Chatting is preferred over video and voice calls to maintain privacy. [122]

The DSH platform is an open innovation ecosystem that enables the development, discussion, criticism, testing, and collaboration of innovative solutions. To protect ideas from being copied in the market, patent rights must be provided. Stakeholders must feel protected and trust the platform to share and work on their ideas, so incorporating patenting and copyrights is crucial. The decision-making structure is democratic, with no hierarchies, allowing everyone to make decisions for themselves and act responsibly. Contests can also be held to attract and encourage users to generate innovative ideas, with cash prizes or gift cards as rewards. [122]

External rewards play a significant role in driving the participation of stakeholders and innovation actors on the platform. For older adult participants, benefits include feeling significant and involved in creating products and services, combating social isolation and loneliness, accessing existing services conveniently, receiving tailored educational resources and training programs, and gaining access to assistive technologies and tools. The platform should be engaging, useful, and convenient to sign up for, enter, and navigate to ensure user retention. The government, incubation centers, and private sectors should be interested in financing the platform to support innovation development processes and address social challenges [122].

A smart specialization approach was employed to develop the DSH supporting the silver economy. Considering this, a Smart Silver Framework was developed, which represents a pilot cooperation model that enables collaboration between stakeholders and increases their capacity to generate economic growth through innovation. The Smart Silver Framework consists of three layers, with the first layer focusing on the quadruple helix actors. The second layer consists of infrastructure focus areas for each helix actor, and the third layer consists of classification and references. The Smart Silver Framework was evaluated and validated by each region and found to be flexible, scalable, and transferable [123]. A detailed report on the Smart Silver Framework is publicly available.[9]

The Smart Silver Lab is a multi-level governance structure that employs the Smart Silver Framework and serves as an open innovation ecosystem[10]. The Lab focuses on innovation actors and enables them to connect, coordinate, and build collaboration to develop innovative products and services for the silver economy in the BSR. The Lab uses the DSH to communicate and establish collaborations among its first layer of governance, which is the quadruple helix actors, to identify new trajectories. The Smart Silver Lab also has a repository for all innovative ideas called the Idea Lab, for all the innovative ideas that have been shared by the innovation actors, given feedback on and concluded, as well as the new and upcoming ideas as shown in the user dialogue model in Fig. 2. [123]

Innovation management becomes imperative, and innovation-supporting tools are put to use (Fig. 3). The Open Innovation Development Toolkit[11] supports the development of innovations and helps with prototyping, accelerating market uptake, and enhancing partnerships. The Silver Financing Mechanism[12] connects innovation actors
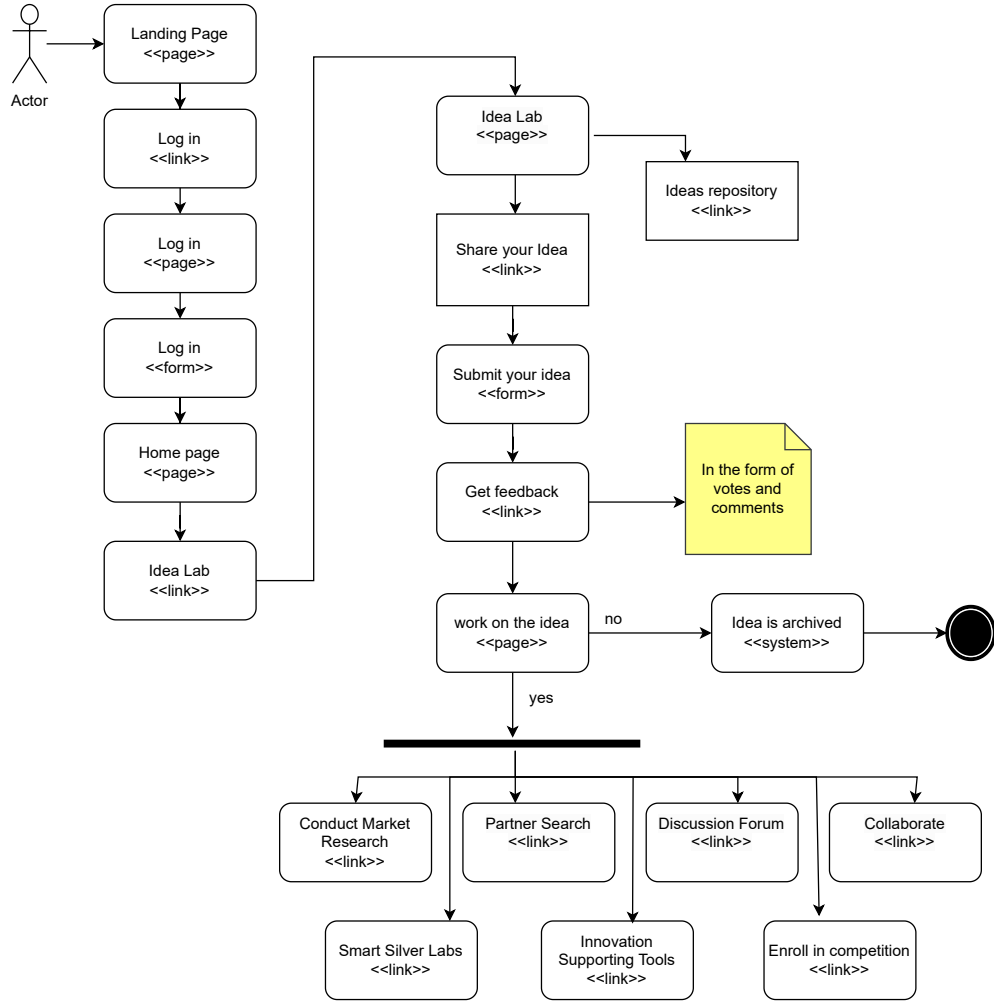
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[9]https://osiris-smartsilvereconomy.eu/smart-silver-framework/
[10]https://osiris-smartsilvereconomy.eu/smart-silver-lab/
[11]https://silverhub.eu/ww/c/10054/p/1
[12]https://silverhub.eu/et/c/10064/p/1

Fig. 2 User dialogue model of Idea Lab [124].

with various funding instruments, and the Knowledge Diffusion Toolkit[13] enhances the knowledge utilization, transfer, and reuse amongst the innovation actors. [123]

The DSH is a collaborative platform that emphasizes networking as an essential part of its mission. The goal is to enable quadruple helix actors to interact and exchange ideas, with the potential to partner on future projects. The platform offers discussion forums, which provide a social space for innovation actors to chat and share ideas, as well as a dedicated partner search function. The DSH also serves as an information hub for events and publications related to the silver economy. It includes a library of silver market characteristics, which can be updated and modified by users.

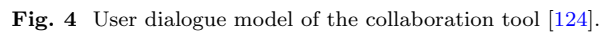[13]https://silverhub.eu/et/c/10284/p/1

Fig. 3 Innovation supporting tools.

The most important feature of the DSH is its collaboration tools, which allow project owners and managers to invite new partners, assign tasks, create agendas and workflows, schedule deadlines, and hold Zoom meetings. Users can also make notes, upload files, and archive projects that are no longer active as shown in the user dialogue model in Fig. 4. With these tools, innovation actors can work together efficiently and effectively. [123]

To use some of the functionalities on the DSH platform, users must sign up and log in with the correct email and password format. If entered incorrectly, users will be redirected to an error message and asked to re-enter their credentials. Once logged in, users can manage their accounts, edit their data, and change their passwords. [123]

Furthermore, users can conduct market research on the DSH through one-on-one discussions with different actors, building and sharing surveys, or organizing focus group discussions. Testers can incentivize participation in testing by offering gift cards

Fig. 4 User dialogue model of the collaboration tool [124].

or other rewards. Competitions are also an option for growing the DSH user base and encouraging innovative ideas. Competitions can be held on various themes related to the silver market and offer rewards like gift cards, prize money, or collaboration opportunities. [123]

The DSH also serves as an information library for all services and products for the silver generation and offers training and mentoring programs to help them learn technical skills. The platform includes an alert module that can be customized to display relevant content based on the user's country. Users can access the information library and training webpage without signing up or logging in. [123]

5 Results

An inductive thematic analysis was conducted, and the following themes were identified in Table 3.

Table 3 Themes.

Themes
Adapting to Digital Innovation and Technology
Expectations for a CI Platform
User-Friendly Interface and Accessibility
Data Privacy and Security Concerns
Potential Impact on Quality of Life

5.1 Adapting to Digital Innovation and Technology

Many people struggle to adapt to digital innovation and technology, especially seniors who struggle to keep up with rapid changes in an increasingly digitalized world. The interviews revealed several challenges faced by the silver generation.

One of the obstacles faced by older adults is their lack of familiarity with digital technology. Since many older adults grew up in an era without the use of computers and smartphones, they often struggle to navigate and utilize these devices effectively. Learning technologies can be frustrating for them, leading to feelings of inadequacy. One of the interviewees stated:

"It's becoming increasingly challenging for me to stay updated with all these gadgets. They seem complex and difficult for me to grasp."

Some older adults of both age groups shared how physical limitations hinder their ability to use devices efficiently. Visual impairment, arthritis, and other age-related health conditions can make typing on keyboards or reading text on screens challenging. One interviewee mentioned, "My vision isn't as good as it used to be, so I find it difficult to read text displayed on screens." In addition, financial constraints can also pose an obstacle for older adults when it comes to accessing and affording technologies. Devices like smartphones and computers as internet services can often be quite costly, especially for those living on fixed incomes. An 80-year-old interviewee said, "Considering my pension, purchasing a smartphone or paying for an internet connection is not something I can afford at the moment."

One common concern expressed by older adults is a fear of technology itself. This apprehension often arises from worries about making mistakes, falling victim to scams, or accidentally damaging their devices. An interviewee stated, "I've come across stories about individuals having their information stolen online. It makes me anxious about using these devices and services." However, older adults aged 55-65 were more confident and accepted technology with risks involved. Older adults aged 55-65 were using technology at their workplaces and were aware that adapting to technology was imperative to survive in the job market. Therefore, they were more well-versed with different technology intricacies and aware of cyber-hygiene. As one of the interviewees stated, "We use computers at work and are able to use them, but when a new tool is

introduced, we need training, while younger employees are able to self-learn." How-ever, when asked if older are comfortable with innovative changes at work, most of the interviewees in the age group of 55-65 were reluctant and confessed that they'd prefer rather no further changes till retirement. Therefore, another challenge encountered is resistance to change among both groups of older adults who have become accustomed to ways of doing things. This resistance extends to adopting technologies well, espe-cially among older adults aged 65 and over. The majority of older adults aged 65 and over prefer calling a taxi by phone and going to the bank to pay bills instead of using e-services. However, if they were forced to use online services and there was no option of using conventional ways, only then were they willing to adopt. An interviewee of 65+ said, "I have been able to get by without relying on all this technology. I fail to see why I should start using it."

5.2 Expectations for a CI Platform

The interviewees were walked through different functionalities of the DSH, and their response was recorded, which leads to the second theme focusing on the expectations and desires of the silver generation regarding the DSH. Most of the interviewees per-ceived this platform as a solution to address some of their challenges and cater to their needs. Many seniors expressed their desire for the platform to help them con-nect with friends, family, and like-minded individuals. As social interactions tend to decline with age, having a platform that encourages and enables engagement becomes crucial in combating feelings of loneliness and isolation. One interviewee mentioned, "I'd be thrilled if this platform helps me communicate frequently with my grand kids!" Another interviewee stated, "It will be nice if this platform can help me find a date, as finding one at this age can be challenging." According to the interviewees, to meet this expectation, the platform must incorporate features that promote interactions such as video calling, messaging services, and online communities based on shared interests. Moreover, older adults hoped the platform would provide access to essential services such as healthcare, shopping, and entertainment. This convenience is especially valu-able for seniors with mobility issues or limited access to stores and services due to factors like weather. One participant remarked "During bad weather, I wish I could order groceries and consult my doctor through the platform."

One key aspect that needs attention is creating a convenient and easy-to-use user interface. Since seniors have varying levels of digital literacy, it is essential to design an interface that's simple and intuitive. Interviewees stressed the significance of avoiding complexity or confusion. As one of the interviewees stated, "I prefer a platform that doesn't require me to read a manual. Keep it simple. I'll be more likely to use it." Interviewees mentioned that designers and developers should conduct usability testing with individuals to identify pain points and make improvements. The interface should be clean, with navigation, and prominently display essential features. Additionally, customization and personalization are highly desired by some seniors. They expressed an interest in accessing personalized content and services that align with their pref-erences; as one of them mentioned, "It would be great if I could see news articles tailored specifically for me, not just a bunch of random stuff." They preferred that the platform should incorporate customization options such as content filtering and

preference settings. This will allow each individual user to have an experience tailored specifically for them. Personalization has the potential to enhance user engagement and satisfaction significantly.

Regarding learning and skill building, some interviewees expressed their interest in utilizing the platform to expand their knowledge and hone their abilities. They viewed it as an opportunity to delve into hobbies, acquire expertise, and keep their minds active. One interviewee even mentioned, "I've always had a desire to learn painting. Perhaps the platform could offer classes for that." Therefore, the platform should provide a range of resources such as tutorials, courses, and interactive modules that facilitate learning.

5.3 User-Friendly Interface and Accessibility

During the interviews, the topic of a user interface stood out among older adults who emphasized the importance of simplicity and ease of use. Given the varying levels of literacy, seniors must have an interface that's accessible and appealing to all users. It is essential to have an intuitive navigation system that allows older adult users to navigate through the platform effortlessly. Complex or cluttered navigation can cause confusion and frustration, and therefore, designers should prioritize an organized layout with recognizable menus and buttons. "I feel lost when there are buttons and options. I prefer something simple." Considering that visual impairments are prevalent among individuals, ensuring readability is crucial in interface design; as one of the interviewees stated, "I strain my eyes when the text is too small or when colors are difficult to read."

A simple and clutter-free design can benefit seniors as it reduces load and allows them to focus on the aspects of the platform. As one interviewee mentioned, a design without distractions helps them stay focused. To ensure a smoother user experience, it is important to avoid animations, pop-ups, and advertisements. The use of icons and imagery can greatly aid comprehension for seniors who may have difficulty with text-based information. As another interviewee mentioned, icons make things more apparent when they don't understand all the words. To assist users in case they encounter difficulties, it is crucial to provide error messages and accessible help features. As an interviewee stated, having a message that explains what went wrong and what to do next is helpful.

The platform should also be responsive and adapt well to devices such as smartphones, tablets, and computers; as an interviewee said, "I use my tablet frequently, so it's important that the platform functions on it, too." Ensuring compatibility across devices is crucial in making the platform accessible and allowing users to interact with it on their devices comfortably.

5.4 Data Privacy and Security Concerns

During the interviews, it became evident that data privacy and security are one of the biggest worries for the silver generation. Specifically, there were concerns about sharing information, particularly among older adults who may be more susceptible to online scams and data breaches. Therefore, building trust is crucial when addressing

data privacy concerns. Interviewees emphasized the need for transparency regarding how their data will be collected, used, and protected. One interviewee expressed this sentiment by stating, "I would require assurance that my data won't be misused or fall into the wrong hands." The platform should clearly outline its data privacy policy and ensure that users are well-informed about how their data is handled.

Moreover, robust and reliable authentication methods can serve as a deterrent against access to user accounts and sensitive information. As one interviewee highlighted, "I worry about someone hacking into my account. Developers need to make sure it's well protected." Implementing measures such as two-factor authentication can significantly enhance account security but leads to complexity at the same time. However, older adults aged 55-65 were more comfortable sharing information like their name, company name, job position, and skills. However, email addresses and phone numbers should only be shared when approved to collaborate. One of the interviewees aged 55-65 stated, "I have nothing to hide, but I don't want anyone to spam me." Those aged 55-65 were also already aware of two-factor authentication and used it often for their bank and social media logins to secure their accounts. In addition, respecting user consent is a consideration when collecting and utilizing their data. The platform should prioritize the implementation of a consent mechanism that empowers users to make decisions about sharing their data.

Furthermore, it was highly stressed that the importance of being informed about scams and tactics employed by scammers should be discussed frequently on platforms such as the DSH. Incorporating resources into cybersecurity practices can equip users with the knowledge they need to protect themselves effectively. Addressing privacy concerns proactively, a few older adults suggested that providing options to use the DSH anonymously could enhance user comfort and encourage trial without revealing details. Therefore, the DSH should offer features that allow users to maintain anonymity while using certain platform features, as it can instill a sense of security and peace of mind among users.

5.5 Potential Impact on Quality of Life

The interviews discussed the potential impact of the DSH on older adults' lives. Many interviewees expressed optimism regarding how this platform could enhance their quality of life, foster social connections, and provide support. Several interviewees aged 55-65 believed that using the platform could help them overcome feelings of loneliness and isolation by facilitating interactions and connections, especially after their retirement. Older adults aged 65 and over also acknowledge that the DSH can help them develop their social lives as one interviewee of 65+ stated, "Living alone sometimes makes me feel lonely. It would be wonderful to have a platform where I can talk to others."

The ability of the platform to offer access to services was seen as a significant benefit. An interviewee stated, "Being able to access services without leaving home would be a relief, especially when I'm not feeling well." However, having too many options in one place can be confusing, and a rating or testimonial system should exist. Such as for transport, only having different taxi services is not going to help, but if

each service can be filtered in terms of wheelchair-friendly, supportive staff, pricing, and readily availability, it can help make choices more accessible and convenient.

Some of the interviewees in the age group of 55-65 mentioned that utilizing the educational resources and interactive features of the DSH could contribute to stimulation and cognitive well-being. They mentioned that after retirement, they would need something to keep them active, enrich their abilities, and enhance feelings of usefulness and significance. An interviewee said, "I want something that challenges my brain and keeps me engaged." Some of the features of the DSH, such as Idea Lab, partner searching, and collaboration tools, were appreciated by many seniors, especially the ones who plan to work on their business ideas. They emphasized that the DSH has the ability to empower individuals and promote their independence. An interviewee mentioned, "I don't want to feel reliant on others. It would be great to have a platform that supports my independence." Some seniors were also very interested in the opportunity of taking training and classes in their regions and/or online. They were primarily interested in learning different apps like SmartID and banking e-services to help them with daily routine tasks independently. By offering tools and resources that enhance autonomy, the platform can help individuals feel empowered.

6 Discussion

6.1 Theoretical Implications

The research findings have significant implications for improving our understanding of the challenges faced by the silver generation in the digital age. These challenges include unfamiliarity with technology, physical limitations, financial constraints, resistance to change, and a fear of technology [80]. Overcoming these obstacles is crucial for implementing and adopting platforms like the DSH that cater to the needs of the silver generation. Specifically, we must consider how platforms can impact their lives in terms of technology adoption, user interface design, and data privacy [80]. These implications provide valuable insights into the importance of creating platforms that cater to seniors' diverse needs and encourage their participation in the digital world [18].

The expectations of older adults from the DSH are varied and multifaceted. One key expectation is social connectedness, as many seniors express a desire to use the platform to stay in touch with family, friends, and like-minded individuals [67]. This highlights the importance of incorporating features encouraging interactions, such as video calling, messaging services, and online communities centered around shared interests [122]. Furthermore, access to services like healthcare, shopping, and entertainment is highly valued by seniors with mobility issues. The need for customization and personalization was also emphasized to ensure that content and services align with preferences [41].

Designing a user interface is crucial in order for older adults to navigate and use the platform effortlessly [93]. Simplifying the interface design using text icons, avoiding excessive clutter, and ensuring responsiveness across different devices (such as smartphones, tablets, and computers) are all important considerations in creating an accessible platform that caters to diverse user preferences [40].

Moreover, the issue of data privacy and security has become a concern for people, highlighting the need for transparent handling of data to build trust [43]. To address these concerns, it is crucial to implement authentication methods, obtain user consent, and provide cybersecurity education [78, 81, 82]. Additionally, offering options for anonymity can help users feel more comfortable and encourage them to try out services without revealing information.

The user-centric evaluation was utilized to design the DSH so that user input and feedback can be incorporated to ensure that older adults participate in co-creation and knowledge sharing on the DSH [21, 94, 97]. One very interesting outcome of the study is that the focus of the DSH should be on older adults aged 55-65 as they age and enter older age groups; they are more comfortable with technology and acknowledge that digital transformation is for their benefit [87]. They are the future of the silver economy, and if the right strategies and efforts are implemented, they can help contribute to the economy. Nonetheless, the DSH involves all age groups within the silver generation and tries to design the DSH that is impactful for the existing and upcoming silver generations.

6.2 Practical Implications

The research findings offer valuable insights and recommendations for the development, implementation, and promotion of digital platforms tailored to meet the needs of the silver generation. Collaboration among stakeholders, including governments, governmental organizations, technology companies, and educational institutions, is crucial in realizing the potential of platforms catering to the needs of the silver generation. Partnering with experts in aging, technology, and user experience will inform platform design while addressing challenges and delivering solutions. It is also important to prioritize user feedback and continually seek improvements to ensure that platforms meet seniors' evolving needs effectively. By regularly listening to input from seniors and involving them in the process of co-creation, platforms can stay relevant and have an impact [125].

The following are the summarized recommendations that have emerged as a result of the user-centric evaluation:

- It is crucial to design the DSH with a focus on user needs by considering the challenges and preferences of both age groups within the silver generation. Conducting usability testing with older adults will help identify areas for improvement and ensure an interface that is easy to use.
- Making sure the platform is accessible to users with physical and cognitive impairments is essential. Features like adjustable font sizes, easy-to-read text, and voice-activated commands can enhance usability for older adults.
- Adding personalization features that allow users to customize their experience based on their preferences can significantly enhance user engagement and satisfaction. Features like content filtering, preference settings, and personalized recommendations can cater to their needs.
- It is important for the platform to be dynamic and continuously adapt to the changing needs of the silver generation. Seeking user input, gathering feedback, and

regularly updating the platform to address evolving requirements are crucial for maintaining user engagement.

- Providing offline support options such as helplines and community centers can bridge the divide for the silver generation, who may have limited access to online services or face technological challenges.
- Building trust with users is essential, and this can be achieved through data handling practices. Clearly communicating the platform's data privacy policy and obtaining user consent for data usage are steps in establishing trust.
- Including resources on cybersecurity practices and raising awareness about scams can empower users to protect themselves while addressing concerns about data privacy.
- Collaborating with experts in aging, technology, and user experience can lead to solutions that effectively address the needs of the silver generation.
- Regularly evaluating the impact of the platform on seniors' lives through surveys and feedback can provide insights for continuous improvement and policy development.

6.3 Future Work

Although this research has provided valuable insights into the challenges and expectations of the silver generation when it comes to digital platforms like the DSH, there are still several areas that require further study. A cyclic, iterative process will be at the core of our research journey. To achieve this, we will prioritize engagement with users and continuously incorporate their perspectives and insights into the research and design process. Our iterative approach will enable us to refine our design solutions based on user feedback and the changing technological landscape. We are committed to responding to user input by adapting and enhancing the DSH platform, thereby effectively overcoming barriers faced by the silver generation while providing support for their digital interactions. Recognizing that the digital realm is dynamic and constantly evolving, our iterative approach allows us to remain flexible in tackling unforeseen challenges that may arise during the implementation of DSH. By refining design ideas, incorporating features, and adapting to evolving user requirements and technological advancements, the study will be thoroughly prepared to meet the changing landscape of user needs and technological progress.

Inclusive design is a crucial aspect that future research can explore, particularly in relation to the silver generation. This involves investigating design strategies that cater to a range of physical and cognitive abilities. Exploring the use of voice recognition, gesture-based interactions, and other emerging technologies can significantly contribute to creating platforms that are more accessible for seniors.

To maintain and improve user engagement among seniors on platforms, it is crucial to understand how to implement effective strategies. Future studies can explore techniques for ensuring that seniors continue to use these platforms in the long run. This can involve implementing gamification methods, offering personalized content recommendations, and providing incentives that align with the preferences and motivations of seniors. The progress made in technology, such as the Internet of Things

(IoT) devices and virtual reality, brings possibilities for enhancing the digital experiences of seniors. Future research can explore how these innovations can be integrated into platforms like the DSH to address challenges faced by seniors effectively.

Furthermore, it is essential to perform comparative analysis across different regions and countries to understand the unique characteristics, such as socio-cultural-economic factors, that influence ICT adoption and integration among the silver generation. By tailoring strategies and solutions for the specific needs of the silver generation in different regions, researchers can identify patterns and common characteristics. Additionally, exploring the user experience aspect of different platforms can help optimize the design and features for a more user-friendly experience. These features can be integrated into the DSH to increase its usability and accessibility to seniors in different regions.

Finally, the long-term sustainability of the DSH needs to be addressed. Factors such as funding, governance, and stakeholder engagement strategies need to be analyzed and implemented. To ensure the DSH's sustainability and maintainability, policies, daily practices, and user workflows should be made flexible and autonomous. Interoperability is also fundamental to ensure service ordering capability and secure cross-border data exchange. This helps to increase the collaborative capacity of organizations to provide innovative solutions [126]. Further research and deeper investigation are required to develop a transnational multi-stakeholder network focused on the silver economy to raise the DSH's capacity to support cross-border data exchange and innovative solutions.

6.4 Limitations

It should be noted that one limitation of this study pertains to the process of selecting participants and their characteristics. While we made efforts to ensure diversity in terms of age, gender, socio-economic background, and technological proficiency, the final group of participants may not fully represent the silver generation from different regions. Thus, the specific characteristics of the participants could impact how applicable the findings are to a range of demographics. The study was conducted in six regions within the BSR, including Denmark, Estonia, Finland, Latvia, Lithuania, and Russia (St. Petersburg). Nevertheless, it's essential to keep in mind that cultural differences and regional variations in technology adoption, usage behavior, and challenges may not be fully captured within this scope. Therefore, it's possible that these findings have limited relevance outside of these regions.

Moreover, the study engaged with participants over a relatively short period of time, which limits our understanding of how their perceptions and experiences with the DSH might evolve over the long term. To gain insights into the lasting impact of the platform on participants' digital interactions, a longer engagement period would be beneficial.

Despite using a purposive sampling approach for recruitment, there is still potential for bias. Those who volunteered for the study may have had an interest or proficiency in technology compared to others, potentially resulting in an over-representation of tech-savvy participants. This bias may impact the ability to apply the findings to seniors who are less familiar with technology. Moreover, it is worth noting that using

English as the language for data collection could unintentionally exclude a segment of the silver generation who are not proficient in English. This limitation is due to factors such as the language skills of the researchers and available resources. Therefore, the findings may not accurately reflect the experiences, difficulties, and preferences of adults who do not speak English. Different cultures and linguistic backgrounds can influence how technology is perceived in terms of digital interaction and the challenges faced. By focusing solely on English-speaking participants, valuable perspectives from individuals who primarily use other languages in their daily lives may be disregarded.

Finally, the fast pace of progress means that the digital environment is constantly changing. The features and functions of platforms designed to tackle challenges might become outdated or inadequate as new technologies emerge. Therefore, it's essential to update and adjust the platform to maintain its relevance.

7 Conclusion

Digital platforms designed for the silver economy have the potential to significantly improve the lives of the silver generation, enriching their connections, access to services, and overall well-being. However, to fully realize this potential, it is crucial to address the obstacles and challenges faced by older adults. This study explores how a digital collaborative CI platform, Digital Silver Hub, can effectively address and mitigate those barriers for the silver generation. By adopting a user-centered evaluation following the principles of ISO 9241-210, prioritizing accessibility, personalization, and transparency, and encouraging engagement, the DSH can bring about meaningful changes in the lives of the silver generation. It is also essential to consider different age groups within the silver generation, as each group has its own requirements. This research offers theoretical and practical implications for stakeholders designing digital collaborative platforms for the silver economy, emphasizing the importance of tailoring solutions to meet the specific needs of different age groups within the silver generation. As societies grapple with the challenges posed by an aging population, investing in platforms catering to the needs of the silver generation becomes beneficial and imperative in promoting active and healthy aging for future generations.

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