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Accessible E-Governance: A Case Study on the Usability of Estonian E-Services for Ukrainian Refugees

Master's thesis

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Ligipääsetav e-valitsemise: Eesti e-teenuste kasutatavusest Ukraina põgenike näitel

Magistritöö

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Author’s declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

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Abstract

This study aims to explore how newly arrived Ukrainian refugees in Estonia interact with the host country's e-services, identifying the challenges they face and proposing solutions to make these digital services more accessible and to better support refugees during migration and facilitate their integration into Estonian society.To explore the Ukrainian refugees, interacting with Estonians e-services and this case study uses qualitative research methodology. The data collection revolves around focus group discussions, which took place between 15th of March and 28th of March 2024. The focus group discussions involved Ukrainian refugees sharing their experiences using digital technologies and e-services in Estonia. Participants highlighted their struggles and successes with e-services. Key issues included language barriers, difficulty navigating systems, and a lack of clear guidance on accessing e-services. They suggested improvements like detailed instructions, training in digital literacy, and centralized resources for newcomers. Participants emphasized the importance of community support from both locals and fellow refugees in adjusting to using Estonian e-services.

This thesis is written in English and is 64 pages long, including 10 chapters, 3 figures and 3 tables.

Keywords: E-services, Digital Literacy, Integration, Refugee Integration, Digital Governance, Migration, Public Service Design, Ukrainian Refugees, Inclusivity

Annotatsioon

Uuringu eesmärk on välja selgitada, kuidas saaks Eesti e-teenuseid kujundada, et parandada nende ligipääsetavust ja kasutajasõbralikkust hiljuti saabunud põgenike jaoks. Lisaks keskendub uurimus võtmetegurite tuvastamisele, mis mõjutavad põgenike digitaalset kirjaoskust, ning konkreetsetele väljakutsetele, millega nad Eesti e-teenuseid kasutades kokku puutuvad.

Et uurida hiljuti Eestisse saabunud põgenike digitaalset kirjaoskust ja selle integreerimist, kasutab see uuring kvalitatiivset uurimismeetodit. Andmekogumine põhineb fookusgrupi aruteludel, mis toimusid ajavahemikus 15. märts kuni 28. märts 2024. Fookusgrupi arutelude esimene osa keskendus osalejate kogemustele digitaalse kirjaoskuse vallas, võrdlustele varasemate kogemustega ning nende sotsiaalsetele suhetele Eesti kogukonnas. Arutelude teine osa keskendus võtmetegurite kindlakstegemisele, mis mõjutavad uus-sisserändajate e-teenuste kasutamist Eestis, ja peamistele väljakutsetele, millega nad riiklike e-teenuste kasutamisel kokku puutuvad. Fookusgrupi arutelud tõid esile Ukraina põgenike kogemused Eesti digitaalsete tehnoloogiate ja teenuste kasutamisel. Peamised probleemid hõlmasid keelebarjääre, süsteemide keerukust ja selgete juhiste puudumist e-teenustele ligipääsemiseks. Nad pakkusid välja lahendusi, nagu üksikasjalikud juhised, koolitused digitaalse kirjaoskuse osas ja uustulnukatele mõeldud kesksed ressursid. Osalejad rõhutasid kogukonna toe olulisust nii kohalike elanike kui ka teiste põgenike poolt, mis aitas neil Eestis e-teenuseid kasutada.

Lõputöö on kirjutatud inglise keeles ning sisaldab teksti 64 leheküljel, 10 peatükki, 3 joonist ja 3 tabelit.

Märksõnad: E-teenused, digitaalne kirjaoskus, integratsioon, põgenike integreerimine, e-valitsemine, migratsioon, avaliku teenuse disain, ukraina sisserändajad, kodaniku kaasamine.

List of abbreviations and terms

ICT	Information and Communication Technology
NGO	Non-Governmental Organisation
OECD	Organization for Economic Co-operation and Development
GDPR	General Data Protection Regulation
WHO	World Health Organization
EU	European Union
AI	Artificial intelligence
WCAG	Web Content Accessibility Guidelines

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1 Introduction

Estonia has become a destination country for migration, while the movement of migrants, including refugees, continues to rise globally. Mass migration has become a defining global phenomenon in recent years, with millions seeking refuge across borders due to conflicts, natural disasters, and other crises [1]. Estonia, known for its advanced digital infrastructure, has increasingly become a destination for migrants, particularly following the 2022 military invasion of Ukraine by Russian Federation forces. This conflict led to a significant influx of Ukrainian refugees into Europe, with Estonia accommodating a notable number relative to its population size. As of early 2025, approximately 54,000 Ukrainian refugees have registered for temporary protection in Estonia, constituting about 3% of the country's population [2] [3].

These refugees, who make up a sizable section of Estonia's population, pose a unique demographic challenge to the country's general service providing including e-services infrastructure. In the 2023 OECD Digital Government Index, Estonia ranks sixth. This ranking highlight Estonia's approach to digital government, which incorporates foundations across multiple dimensions while demonstrating effectiveness in both the development of digital public infrastructure and the implementation of digital governance rules and regulations [4].

As citizens of Ukraine, many arrive with little or no knowledge of the Estonian language, varying levels of digital literacy, and limited access to technology. These factors may affect their ability to navigate a system that relies on digital platforms. For Ukrainian refugees, accessing essential services such as healthcare, housing, social benefits, and education is often connected with the need to engage with Estonia's e-government tools. Therefore, this thesis focuses on how a highly digital nation like Estonia can meet the users' needs in the case of an increased immigration situation.

While the country provides streamlined access to services for long-term residents, it may pose significant barriers for newcomers unfamiliar with the digital platforms. For Ukrainian refugees, these barriers may be amplified by the urgent nature of their displacement, which leaves little time to adapt to a new highly digital based society.

This research presents an opportunity for Estonian governmental institutions to enhance their e-governance service provision model to better support vulnerable population groups during sudden mass migration and smooth their integration into society.

The Ukrainian refugee case highlights a broader question about inclusivity and adaptability in e-governance. How can a government ensure that its digital infrastructure does not exclude vulnerable groups? How can public services be designed to serve a sense of belonging and integration for those forced to migrate into a new country? Addressing these questions is critical not only for Estonia but also for other nations dealing with similar challenges.

Moreover, exploring the experiences of Ukrainian refugees in Estonia is also an opportunity for policymakers to improve the e-government services provided to all residents.

Adapting e-services to meet the needs of Ukrainian refugees and other immigrant populations goes beyond technical innovation; it underscores Estonia's dedication to equality, inclusivity, and human dignity principles. By tackling these challenges, Estonia can build a more inclusive digital society that not only facilitates integration but also strengthens the service quality for both newcomers and long-term residents.

1.1 Research questions

This study explores how newly arrived Ukrainian refugees in Estonia interact with the country's e-services, identifying the challenges they face and proposing solutions to make these digital services more accessible, better support refugees, and facilitate their smooth integration into Estonian society.

Based on the research objective, the author focuses on the following main research question:

How can Estonian e-services be re-designed to improve accessibility and usability to support the integration of Ukrainian refugees?

The author has formulated two sub-research questions to answer the main research question:

SRQ1: What factors influence the usage of e-services in Estonia?

SRQ2: What are the main challenges amongst Ukrainian refugees of using Estonian e-services?

The author believes that answering these questions provides valuable feedback for the government authorities to adjust the services and related processes from the refugee's perspective.

1.2 Expected outcomes

The primary expected outcomes would involve recommendations that can help to improve accessibility and usability for Ukrainian refugees using Estonian e-services. Moreover, this study also emphasises the importance of public service design and development in addressing the needs of refugees. This includes rethinking how e-services are designed and ensuring they are adaptable and accessible to diverse user groups, such as refugees arriving from Ukraine. Public service designers could benefit from these findings by incorporating user feedback creating services that are inclusive of users with various barriers. By implementing these principles into the design process, e-services can become more user-focused.

One key outcome would be identifying specific factors that affect the digital integration of Ukrainian refugees. These findings can inform future policies designed to reduce barriers to digital literacy and enable refugees to access essential e-services more effectively, ensuring a smoother and faster integration process into Estonian society.

Possibility of making future policy recommendations using the factors discovered that may affect digital integration, which can help faster integration processes by identifying and addressing the barriers. This will make it simpler for refugees to access important e-services. Furthermore, the outcomes of the research can help with the creation of materials and programs to promote digital literacy among refugees. This could involve developing training materials, seminars, or programs for digital inclusion that are tailored to refugees.

1.3 Thesis outline

This dissertation is organized into nine main chapters. Chapter 1 introduces the study, outlining the research questions, expected outcomes, and providing a thesis structure. Chapter 2 presents a literature review, focusing on key topics such as the provision of e-services to refugees, factors influencing the use of digital services, the role of digital literacy in refugee integration, and specific considerations for Ukrainian refugees. Chapter 3 outlines the theoretical framework that guides the research and analytical approach. Chapter 4 details the methodology, describing the research design, focus group interview process, participant selection criteria, ethical considerations, and data analysis methods. Chapter 5 presents the research results with thematic findings and focus group interviews, followed by a summary of key themes, and concluding with a comparative review of two Estonian public e-service platforms. Chapter 6 provides a discussion and interpretation of the findings, structured around major analytical themes, and offers practical recommendations to improve the accessibility and usability of Estonian e-services for newly arrived refugees. Chapter 7 addresses the study's limitations and outlines suggestions for future research. Chapter 8 summarizes the study. Lastly, Chapter 9 includes the list of references used throughout the dissertation.

2 Literature Review

Over the past decade, social sciences and other academic fields have experienced growing interest in the research of forced displacement. Although refugee studies have formed an independent academic discipline since the early 1980s, a variety of fields such as political science, economics, law, international relations, demography, and public health have recently started to emphasize forced displacement as a research focus [5] [6].

This chapter is arranged on providing an overview of existing literature on refugees using e-services and main challenges related to using e-services in a hosting country, looking into the academical research findings and gaps. The literature review is sectioned into two parts. Firstly, it explores general academic studies related to the provision of e-services to migrants, identifying key themes and challenges covered in the research. Secondly, the literature review narrows to research specifically addressing the provision of e-services to Ukrainian refugees, considering the circumstances arising since the start of the war in 2022. To ensure relevance and latest trends, the literature review includes research work conducted during the past ten years. For the literature review search, databases such as SCOPUS, Google Scholar, and ResearchGate were used to identify academic work. Google Scholar was particularly used, as it is one of the largest databases for scientific publications. Moreover, online resources such as the UNHCR Refugee Research Database and the International Organization for Migration (IOM) were used to gather relevant policy reports and studies.

The following strategic keywords were used for the literature search: digital public services accessibility for migrants/refugees; refugees and e-government services design and user experience; barriers to e-government use and migrants/refugees; usability challenges and e-services and migrants; e-government accessibility and refugees.

2.1 Provision of e-Services to Refugees

E-services provided by the government play an important part in the integration of refugees by enhancing accessibility to basic services and promoting socio-economic inclusion.

AbuJarour et al. (2019) focuses on the broader picture of ICT-facilitated refugee integration. Their study defines seven essential themes from panel discussions: 1) accessibility to information, 2) availability of education and linguistic resources, 3) admissibility to labour markets and entrepreneurship opportunities, 4) communicability with home country, 5) connectedness with local population, 6) interactivity with the host government, and 7) volunteer coordination. That highlights how ICT may connect refugees with host communities [7]. By showcasing initiatives such as mobile applications that offer multilingual information and platforms for volunteer coordination, they show the ability for ICT to encourage social inclusion and economic development, while noting the need for culturally sensitive design and cross-sector collaboration [7].

In Kronoberg, Sweden, for example, e-government services assist refugees by providing digital access to local services and information; nevertheless, the success of these services largely depends on the level of digital literacy and trust that the refugees have in these services [8]. Also, a study made in Greece assesses how e-government services help refugees in Greece to integrate into the workforce. Study reveals that although e-government is perceived as beneficial there still are significant barriers such as restricted internet connection, language problems, and low digital literacy among refugees. To improve service effectiveness for refugee integration, the research suggests improvements such as multilingual support and improved digital access [9].

2.1.1 E-service accessibility amongst refugees

E-government services aim to facilitate effective and streamlined access to administrative, healthcare, and social welfare services. Numerous studies suggest that these digital platforms unintentionally exclude marginalized groups, including refugees, due to language challenges, digital literacy gaps, and socio-economic limitations [10]. The solid framework for these services often assumes a digitally competent population, overlooking the difficulties of various user experiences. Such as cultural and linguistic

background. Research indicates that using user-centred design concepts and collaboration tackles alongside refugee groups may significantly enhance usability and inclusion [11]. Moreover, digital health solutions for migrants and refugees hold significant opportunities to improve healthcare access, engage users, and increase the delivery of services, if their design and implementation follow to a comprehensive ethically informed framework. The authors claim that digital interventions should be assessed not just for their technical functionalities but also within a context of structural, human, and technological aspects. Authors suggest that digital tools help mitigate common obstacles (such as restricted access to care and information), they also present the risk of increasing inequalities due to concerns like data privacy breaches, surveillance, and different levels of digital literacy [12].

2.1.2 Factors impacting Usage of e-Services Amongst Refugees

Digital public services offer the potential for increased efficiency, enhanced access to essential services, and more social inclusion for refugees.

Researcher Nuriiar Safarov emphasizes the concept of administrative literacy, defined as the ability to navigate and understand bureaucratic institutions. Given the framework of Finland's digital welfare state, his research indicates that despite having digital skills, immigrants can run into significant challenges if they lack the administrative literacy required to understand and access public services. This gap often leads to the inadequate use of available e-services and can lead to social exclusion [13]. Bartlett et al. (2021) research examines a human-centered design methodology in the design of a healthcare application for refugee populations. Their findings demonstrate that involving end customers in the design process results in products that are more culturally pertinent and user-friendly. This participative method mitigates significant barriers, including language differences, poor digital literacy, and a lack of trust in unfamiliar digital platforms [11].

Furthermore, research of Ekoh et al. (2023) focuses on elderly immigrants and refugees, a population that frequently faces complex difficulties, including age-associated decreased in digital literacy and limited exposure to new technology. Their review indicates that although digital technology may significantly improve well-being by enabling social networks and access to essential services, deficiencies in digital literacy and accessibility remain a significant barriers [14].

Collectively, these studies demonstrate that the utilization of e-services by refugees is affected by a variety of related variables. Key factors include the levels of administrative and digital literacy, cultural and linguistic obstacles, user-centered design methods, and the particular needs of vulnerable groups. Addressing these challenges requires a comprehensive approach that takes into account both technology capabilities and the larger socio-cultural context in which refugees utilize digital services.

2.1.3 The Role of Digital Literacy in Refugee Integration

Digital literacy is essential for the use of digital technologies into meaningful engagement for refugees. Alam and Imran claim that although physical access to technology is enhancing, an imbalance exists in the necessary abilities for effective use of such tools. Their research indicates that poor digital literacy could hold refugees from successfully using online information regarding essential services such as education, job, and health, which are necessary for their integration [15]. Moreover, authors, Díaz Andrade and Doolin also propose that digital literacy helps refugees by improving their capacity to utilize autonomy in environments that are unfamiliar. When refugees learn and use digital skills serves not only as pathways for information but also as tools for communication and self-expression, enabling their integration into host society [16]. Pottie et al. similarly point out that inadequate digital literacy could prevent an awareness of the potential benefits associated with social media and other digital platforms—such as increased interaction and access to essential resettlement information while also exposing users to risks like misinformation or breaches of privacy [17].

The literature indicates that digital literacy is not solely about technical skills but an essential component of social inclusion. Improving digital literacy among refugees is crucial to guarantee that access to ICT results in real opportunities for integration and enhanced well-being.

A potential research gap in Estonia is the lack of analysis on how well its advanced e-government services accommodate the unique needs of refugee populations. Since Estonia has never experience the sudden influx of refugees addressing this gap could lead to actionable insights for redesigning Estonian e-services to better support refugee integration and reduce digital exclusion.

2.2 Provision of e-Services to Ukrainian Refugees

The digitalization of public services has become a crucial aspect of refugee support, especially following the displacement of Ukrainians due to the war. Governments and humanitarian organizations have worked to provide e-services that help refugees navigate administrative processes, access healthcare, and secure financial assistance. This section of literature review explores the role of service design in shaping these digital services and examines the key challenges and solutions identified in recent research.

Several studies highlight the importance of digital platforms in supporting refugees.

Polishchuk et al. (2023) investigate how digital remittances have become an essential financial support for Ukraine during crises, particularly during the COVID-19 pandemic and Russia's military invasion. Their analysis of descriptive statistics, utilizing data from the National Bank of Ukraine, Statista, the World Bank, and other sources, show several important trends. Initially, the research reveals that the proportion of formal remittance channels has increased compared to informal ones, underscoring a transition towards safer and more transparent financial transactions. Secondly, although total remittance amounts have varied with a significant decrease during the conflict the average transaction size has significantly fallen, indicating a shift towards smaller, more regular transfers aimed at meeting urgent needs. Third, the geographic assessment highlights Poland as the main origin of remittances, demonstrating the robust financial connections within the Ukrainian diaspora. In conclusion, despite temporary setbacks, the digital remittance market shows resilience, with an increase in users and forecasts suggesting a consistent rebound and long-term expansion. These results highlight the essential role that digital financial services have in crisis management and the overall economic recovery of Ukraine [18].

Moreover, authors Oliychenko et al (2024) observe that although Ukraine's public administration has achieved considerable progress in digital transformation, especially within wartime limitations, significant challenges remain. Their mixed-methods study, combining qualitative findings with quantitative studies via a matrix model for information flows, demonstrates that the existing e-government infrastructure shows both strengths and weaknesses. For example, the adoption of electronic document management systems (EDMS), such as Megapolis.DocNet, has improved document processing and

improved inter-departmental communication. However, disconnected platforms and outdated technologies limit effective information sharing and collaboration across state departments. A SWOT analysis demonstrates that, despite significant digitization shown by an improved e-government development index, ongoing challenges such as platform variety and integration concerns risk operational efficiency. The authors propose a set of strategic improvements to synchronize information systems, encourage collaborative communication, and ensure an ongoing process of digital transformation despite the constraints presented by war. [19]

Sushyk and Sushyk (2023) discuss the expansion of Ukraine's "Diia" platform, which provides a range of digital services such as e-Migration and support for internally displaced persons [20]. Their study emphasizes that while digital services can streamline processes, refugees still face barriers such as language difficulties, limited digital literacy, and technical issues. Furthermore, The UNDP case study (2021) examines Ukraine's approach to human-centred digital transformation, stressing the need for e-services that prioritize inclusivity and usability [21]. A key takeaway from this study is the importance of co-creation, where refugees and local stakeholders contribute to the design of digital tools to ensure that they meet actual user needs.

Moreover, Safarov (2023) introduces the concept of administrative literacy, which refers to a person's ability to navigate bureaucratic structures. This study, focusing on Russian-speaking migrants in Finland, finds that many struggle with complex service interfaces, bureaucratic terminology, and a lack of multilingual support [13].

From the service design aspect, Matlin et al. (2024) propose a framework for digital solutions in refugee healthcare, which also applies to broader public services. Their study highlights key aspects such as data security, user experience, and participatory design to ensure that digital tools effectively serve refugee communities [22].

In conclusion, in Ukraine with advancements in digital public administration, fragmented systems and obsolete technology continue to obstruct efficient communication. Moreover, user-centered design is crucial to addressing obstacles faced by refugees, emphasizing the necessity for inclusive digital solutions for both urgent crisis management and sustainable enhancements.

3 Theoretical Framework

Exploring theoretical frameworks in the realm of designing services for refugees highlights service design. Within the context of service design, it provides a structured understanding of how services can be built. By applying service design principles, researchers can map user journeys, engage stakeholders in co-creation, and develop digital services [23].

The theoretical framework for designing services for refugees builds upon five core service design principles as also presented on Figure 1:

- **Design Research:** Conducting in-depth research to understand refugee experiences, digital literacy levels, and service accessibility barriers.
- **Value Co-Creation:** Engaging refugees, NGOs, and policymakers in service design to ensure alignment with real user needs.
- **User Experience:** Ensuring intuitive, accessible, and language-inclusive digital platforms.
- **Learning & Adaptation:** Using iterative feedback loops and pilot programs to improve service usability and efficiency.
- **Citizen Engagement:** Encouraging active participation in service development to facilitate refugee integration [23].

Figure 1 Service design principles

Current study follows above mentioned service design key elements and focuses on creating digital services in Estonia for Ukrainian refugees. A framework is suggested that relies on five key service design principles. To begin with, value co-creation is highlighted by directly engaging refugees in workshops and focus groups, guaranteeing that services - like housing or language learning applications—are rooted in their lived experiences and cultural backgrounds. Secondly, exploration techniques for design, such as ethnographic research, interviews, and mapping user journeys, are utilized to uncover current service gaps and challenges like digital literacy and language barriers, using existing platforms such as "Settle in Estonia" and "Eesti.ee" as reference points. Third, the focus is on improving user engagement by prioritizing clear, intuitive, and multilingual interfaces that cater to users with different levels of digital skills. Fourth, the structure incorporates methods for continuous learning via consistent feedback loops, questionnaires, and revisions, guaranteeing that the services stay attuned to the changing requirements of refugees. Ultimately, community ownership is encouraged by engaging citizens and incorporating refugees in the design of services and governance via reliable communication channels. This research framework seeks to develop user-focused, inclusive digital services that address both the immediate requirements and the long-term integration and well-being of Ukrainian refugees in Estonia.

Estonia's Digital Agenda 2030 governance framework provides a model for accessible and user-friendly service design. According to the Estonian Ministry of Economic Affairs

and Communications, service design for public digital services is based on principles of user-centricity, accessibility, and security [24].

Expanding on this framework, it's crucial to consider the strategic context offered by national initiatives. The Estonian Digital Agenda 2030, for example, presents a thorough vision for changing public services via digital innovation, enhanced accessibility, and greater efficiency [25]. Aligning the suggested framework with the objectives of the Digital Agenda 2030 allows digital services for Ukrainian refugees to meet urgent needs while also contributing to a wider national initiative to modernize public administration. This alignment guarantees that emerging services enhance Estonia's enduring digital resilience and inclusive development, strengthening the nation’s dedication to a user-focused and inventive digital future.

Key components include:

- Standardized digital design guidelines to ensure usability.
- Multi-language support to accommodate diverse refugee populations.
- Automation and AI-driven support systems to enhance efficiency.
- Cross-sector collaboration between government agencies and NGOs to improve service delivery [24].

Expanding upon the existing framework and the strategic context outlined in the Estonian Digital Agenda 2030, it is vital to guarantee that digital services are both accessible and inclusive. Incorporating the Web Content Accessibility Guidelines (WCAG) 2.2 into the design process aids this objective by offering definitive principles for developing digital content that is perceivable, operable, comprehensible, and resilient for every user. For instance, by following WCAG 2.2 guidelines—such as guaranteeing adequate contrast ratios, enabling keyboard navigation, and offering alternative text for images—the services can be rendered more accessible to those with disabilities, which is especially vital for at-risk groups like Ukrainian refugees. This integration not only harmonizes with the user-focused strategy and inclusive design principles of the framework but also strengthens Estonia’s dedication to a digitally resilient and accessible future.

WCAG 2.2, published by the World Wide Web Consortium (W3C), provides comprehensive recommendations to enhance web content accessibility for individuals with disabilities [26].

- Key Aspects of WCAG 2.2Information and user interface components must be presentable to users in ways they can perceive;
- User interface components and navigation must be operable;
- Information and the operation of the user interface must be understandable;
- Content must be robust enough to be interpreted reliably by a wide variety of user agents, including assistive technologies;

WCAG 2.2 introduces nine new success criteria, focusing on enhancing accessibility for users with low vision, cognitive and learning disabilities, and motor impairment.

WCAG 2.2 directly guides this effort by offering explicit, quantifiable benchmarks to guarantee that digital services are accessible to every user, including individuals with disabilities. The guidelines stipulate that information and interface elements must be perceivable, operable, comprehensible, and resilient. This indicates that digital services aimed at Ukrainian refugees need to display content in formats that users can recognize and engage with (perceivable), ensure that navigation and controls are user-friendly (operable), confirm that the information is easily comprehensible (understandable), and ensure that the service operates consistently across various technologies (robust).

This theoretical framework provides a foundation for understanding how service design methodologies can enhance e-services for refugees. By incorporating service design principles, Estonia’s digital strategy, and WCAG 2.2 guidelines, the study gains a structured approach to evaluating and improving digital services for refugee integration.

4 Methodology

This thesis adopts a case study research design, which facilitates investigations of issues within their real contexts. Applying the case study approach is advantageous when seeking an understanding of a particular issue, event, or phenomenon within its real-life environment [27]. The focus group interviews were used as a source of data collection [28]. Collected data was analysed thematically. This master's thesis also includes materials previously published by the author during their master's studies, consecrated on the same research area.

4.1 Research Design and Approach

This study employs a qualitative case study design to explore how e-services can be effectively designed to support the integration of Ukrainian refugees. The case study approach is suitable for gaining understanding of complex, real-world phenomena, particularly in contexts where the boundaries between the phenomenon and its setting are not clearly defined [27].

The primary data collection method consists of semi-structured focus group interviews with newly arrived Ukrainian refugees in Estonia. These discussions aim to gather insights into their experiences, challenges, and needs when using Estonian e-services. Thematic analysis was used to identify key patterns in the data, particularly those related to accessibility, usability, and inclusion.

This research adopted a qualitative data collection methodology, utilizing focus group discussions as the primary data collection technique. The qualitative design was particularly appropriate given the exploratory nature of the study, which aimed to understand the experiences and perceptions of newly arrived refugees regarding digital literacy and its role in their integration process and use of e-services in Estonia.

In the later stages of the study, a comparative review of two Estonian Health Insurance Fund website and Estonian Unemployment Insurance Fund portal will be conducted. These platforms will be evaluated from a service design perspective, focusing on aspects such as user journey mapping, interface design, language accessibility, and support features. This analysis will complement the focus group findings and provide a deeper

understanding of how well the current digital solutions align with service design principles and the needs of refugee users.

Figure 2 illustrates the research design applied for this thesis. The step taken are as follows:

1. Focus group interviews (Ukrainian refugees in Estonia);
2. Thematic analysis (accessibility, usability, inclusion);
3. Comparative review of two e-services;
4. Service design evaluation (user journey, interface, language, support);
5. Synthesis and interpretation of findings:
6. Conclusion and Recommendations

Figure 2 Case study research design applied for this thesis

4.2 Focus Group Interviews

Focus group discussions are employed to facilitate a dynamic exchange among participants, providing a platform for diverse opinions and fostering a deeper understanding of the collective experience.

Data was collected through direct interactions in focus group settings, which were audio-recorded to ensure accurate and complete transcription for later analysis. The facilitator, aided by a translator, guided the discussion using a discussion guide that included open-ended questions designed to prompt discussion about specific aspects of digital literacy and integration.

Two focus group sessions were conducted:

- The first session took place on March 15, 2024, lasted one and a half hours, and involved six participants.

- The second session was held on March 28, 2024, lasted two hours, and included a group of 7 participants.

The discussion was held in a semi-structured format, guided by a set of prepared questions that align with the research objectives but also allow for the emergence of spontaneous themes and insights. This format was chosen to encourage participants to engage with the topics, share personal experiences, and interact with each other's viewpoints, to ensure the data with a variety of perspectives. To further enhance interaction and depth of dialogue, some questions were initially discussed in pairs, allowing participants to explore ideas in a more intimate setting before sharing their insights with the larger group. This method of discussion in pairs followed by a larger group dialogue helped to facilitate an exploration of the topics, ensuring a thorough engagement with the research topic.

4.2.1 Participant Selection

Participants were purposively selected based on specific criteria to ensure a focused and relevant participant group. The study involved two focus groups, each comprising 6-7 participants, totalling 13 individuals. Participants were selected based on specific criteria to ensure a representative sample of the newly arrived refugee from Ukraine in Estonia. Selection criteria included refugee´s status and their demographic diversity. Only individuals classified as newly arrived refugees, having relocated to Estonia from Ukraine within the past two years, were included. Efforts were made to ensure a representative mix of genders and a range of ages and backgrounds to capture a broad spectrum of experiences and insights.

In more detail, the following principles were followed while selecting the participants:

- Only adult individuals identified as newly arrived refugees, having migrated to Estonia within the last two years were selected.

- A mix of genders and a range of ages, all having migrated different parts from Ukraine, reflecting the diversity within the refugee community.

- A mix of people with different backgrounds.

4.2.2 Ethical Considerations

There were multiple ethical issues that had to be taken into consideration when conducting research with refugees. One of them is getting fully informed and genuinely voluntary consent of participation, maintaining participant confidentiality and anonymity, preventing unintentional harm, and maintaining the "dual imperative" of doing methodologically valid research which helps participants in return. All these challenges come from the unequal power dynamics between scholars and migrants [13].

To mitigate risks and adhere to ethical considerations during the interviews, the following steps were implemented:

Privacy and Confidentiality

Protecting the names and personal data of participants taking part in interviews requires maintaining privacy and confidentiality. Keeping in mind that the anonymity of data is crucial and protected by the GDPR [14]. Anonymous consent forms were taken from participants prior to the interviews. During the interviews only participant's first names were used.

Informed Consent

Getting informed consent by ensuring that sure participants are aware of the research aims and goals, especially in conducting surveys and interviews about e-service usage and digital literacy. It is important for participants to understand that taking part of the research is voluntary and that there is a right to quit at any time without any consequences. To accommodate language differences and ensure clear understanding, informed consent forms were provided in two languages, English and Russian. These forms detailed all pertinent information and ensured that participants were fully aware that their participation was voluntary and that they could withdraw at any time without any consequences (Appendix 3). Participants were required to sign these forms before proceeding with the focus group discussions. The participation forms are hold by the author of this thesis for one year following the defence. The forms are held password-protected digital format.

Cultural Sensitivity and Respect

Recognize and acknowledge the cultural differences among refugees from Ukraine, making sure that interactions are appropriate and considerate. The author of this thesis is trained to work with vulnerable groups and has received specific trainings to working with refugees.

Risk of Harm

Avoid the chance of psychological distress by providing advice, particularly when talking about difficulties in adaptation and integration in a host country. The author of this thesis is trained to work with vulnerable groups and has received specific trainings to working with refugees.

Misrepresentation and Bias

Minimise bias from collecting information and analysis, particularly when interpreting the interactions and levels of digital literacy amongst newly arrived refugees and the level of using e-services in Estonia. Prior to the commencement of each focus group session, all participants were thoroughly informed about the study's objectives, the nature of their participation, the voluntary basis of their involvement, and the intended use of the data collected. Participants were encouraged to ask questions and share their understanding of the topics. Ukrainian translation was provided, and paired discussions were used to support understanding. To ensure clarity, the questions were presented in multiple forms and further explained to help participants understand the full context.

4.3 Data Analysis

To analyse the empirical data gathered in this research, the thematic analysis was used in this thesis. According to Braun and Clarke, there are six phases of thematic analysis, described as guidelines which will be followed in this research. Guidelines for qualitative analysis are just that—guidelines—and must be implemented flexibly to match the research objectives and data while adhering to the fundamental principles. In addition, analysis is an ongoing procedure that involves going back and forth between the stages rather than a linear one where you just go from one to the next [29].

The first step, as per Braun and Clarke's instructions [29], is familiarizing oneself with the gathered data. Active reading is essential to familiarizing oneself with every aspect of

the material. To perform the theme analysis, the verbal data—such as interviews—will be written down and transcribed at this phase. The initial coding concepts will be drafted during transcribing. To ensure the accuracy of the data, the transcripts and the interview recordings will be compared several times [29] .

The collection of the very first codes from the data begins when the author gets an understanding of the data and made a draft list of the initial themes. Since the data will be arranged into classifications, the coding procedure is an element of the analysis. Based on the particular elements of the data that are relevant to the research questions, the transcriptions will be examined and initial codes will be determined. Either a software program or a manual approach can be used to code. Manual approach is used to identify themes and codes. Phase three is expected to start when all of the data has been first coded and processed. The data's interpretive analysis takes place during this stage. The author then compares the context of the codes, examining the significant variations, similarities, and relationships between them. In this phase, the initial codes are sorted to expected themes in relation to the research questions, with a focus on a broader level of themes [29].

Once the potential themes have been identified phase four begins. The previously determined themes will be examined and revised during stage four, which will also involve the revision of the thematic map. To do this, the proposed themes will first be examined using the collected data extracts to assess whether they seem to create a reasonable pattern. Secondly, the themes in the potential thematic map will be assessed to see if they "work" in connection to the full data set [29]. The themes that will be provided as part of the research will be further refined in phase five. Identifying the core of each theme is crucial in order to comprehend what aspects of the data they represent and how the themes relate to the research questions as a whole [29]. The final and sixth phase involves providing a report of the research's findings. Furthermore, the author will look at the research themes whilst delivering a story that fits the research questions [29].

The qualitative data from the focus group interviews were analysed using thematic analysis, following the six-phase framework outlined by Braun and Clarke (2006). This method was selected for its flexibility and suitability in identifying, analysing, and discovering patterns within received qualitative data, especially in exploring personal

experiences and social processes [29]**.** Figure 3 displays thematic analysis stages used in this thesis.

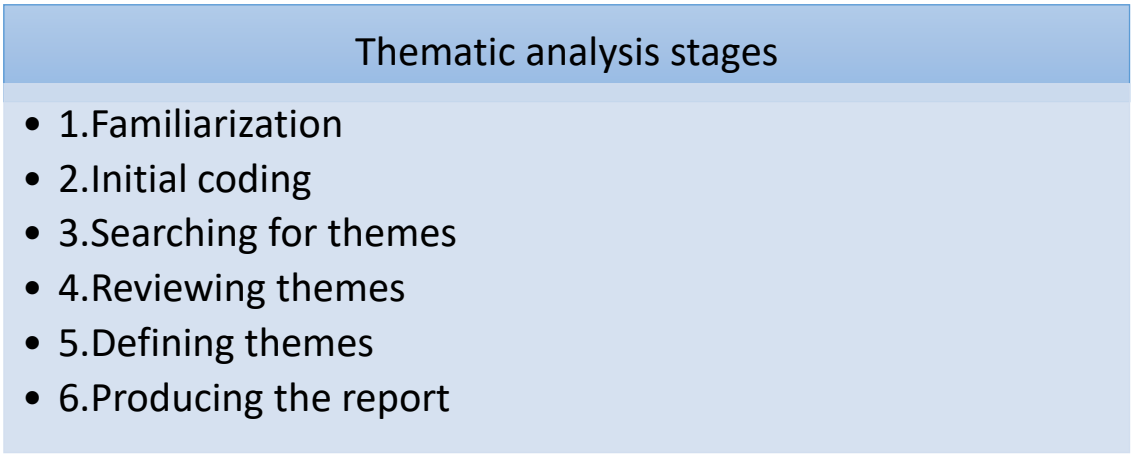

Figure 3 Thematic analysis stages

The first step involved the author **familiarizing** in the data by listening to the audio recordings and reading the transcripts of both focus group interviews. This process helped to gain understanding of the content and to note initial ideas related to participants experiences with digital technologies and e-services in Estonia. Using a manual approach, the author labelled meaningful segments of text directly on printed transcripts. Open **coding** was applied, allowing codes to emerge organically from the data.

Once initial codes were identified, they were grouped into broader categories by identifying patterns and connections between them. Codes that shared common elements or addressed similar issues were gathered into initial **themes**.

Moreover, the initial themes were **reviewed** in relation to the coded data and the entire dataset to ensure internal consistency and distinctiveness. Some themes were combined, or eliminated to better reflect the data. This repetitive process ensured that each theme captured a meaningful aspect of the participants shared experiences.

After refining the themes, each was clearly defined and named to reflect its central idea. Special attention was paid to capturing the content of each theme. For example, themes such as *accessibility and usability* and *digital literacy* as key elements influencing digital literacy and integration in using e-services were identified.

In the final step, the themes were linked with the research questions and results. Quotes and descriptive sentences from participants were selected to support the analysis and to provide insight into the experiences behind each theme. The findings were situated within existing research on the topic of e-service usage amongst refugees.

5. Research Results

The following chapter presents the findings from the focus group interviews, which provides the viewpoints and experiences of the participants. Three main themes surfaced from the thematic analysis: the role of digital skills in the larger integration process, barriers and enablers in accessing Estonian e services, and digital literacy and everyday technology use.

5.1 Focus group interview results

The following chapter presents the findings from the focus group interviews, highlighting the main themes that emerged in response to the research question: *How can Estonian e-services be designed to improve accessibility and usability for newly arrived refugees?* Three key themes were identified: language barriers, user guidance, and personalization. These themes reflect the recurring topics and concerns raised by participants when discussing their experiences with Estonian e-services. Each theme is presented along with relevant examples and perspectives shared during the interviews.

Accessibility

5.1.2 Language barriers

Many participants across both groups highlighted issues with incomplete or inconsistent translations, particularly in official portals like Töötukassa.ee[1] or medical portals. Translation tools like Google Translate[2] were commonly used but often provided inadequate or confusing results. The following examples were highlighted during the focus group interviews.

Focus group 1

[1] Estonian Unemployment Insurance Fund, "Töötukassa," [Online]. Available: https://www.tootukassa.ee/en. [Accessed: May 10, 2025].

[2] Google, "Google Translate – About," [Online]. Available: https://translate.google.com/about/?hl=en. [Accessed: May 10, 2025].

Example 1: Speaker 5 highlighted that "not everything is translated," especially on medical portals. Some content remains in Estonian, complicating usage.

Example 2: Speaker 2 mentioned using Google Translate but noted that translations are incomplete and sometimes confusing, leading to frustration.

Focus group 2

Example 3: Speaker 5 highlighted issues with the Töötukassa portal, which had untranslated Estonian content, making it impossible to register for courses.

Example 2: Speaker 4 noted that PDF files or image formats on job portals couldn't be translated, leaving users unable to understand postings.

5.1.3 User Guidance

Both groups emphasized the need for step-by-step instructions. Participants suggested creating checklists or centralized resources tailored for refugees.

Delayed access to adaptation courses was a common challenge; participants recommended offering such courses earlier and making them more practical. Key examples raised during the focus group interviews are presented below.

Focus group 1

Example 1: Speaker 3 found it helpful to read websites carefully to figure out how to use e-services but noted that others struggle without detailed instructions.

Example 2: Speaker 7 described learning to navigate digital portals during a computer training course but emphasized the need for more guidance tailored to older users.

Focus group 2

Example 1: Speaker 7 suggested detailed step-by-step instructions or checklists for using e-services, particularly for new arrivals.

Example 2: Speaker 6 emphasized the need for accessible explanations about Smart ID[3], Mobile ID[4], and their applications in daily life.

5.1.4 Personalization

Participants expressed a strong preference for services that account for their unique needs, such as guides specifically addressing how to register for family doctors or navigate medical systems.

Both groups noted a lack of centralized portals for streamlined access to essential services, advocating for resources tailored to the refugee experience. Several illustrative examples emerged from the focus group discussions.

Focus group 1

Example 1: Speaker 2 suggested improving tools like Smart ID to be more intuitive and flexible, especially for users unfamiliar with complex authentication systems.

Example 2: Multiple speakers mentioned the importance of having e-services designed with multilingual options to cater to diverse refugee groups.

Focus group *2*

Example 1: Speaker 2 proposed creating a centralized resource with tailored information for refugees, covering topics like family doctor registration and clinic options.

Example 2: Speaker 8 recommended early access to adaptation courses, rather than several months after arrival, to help refugees navigate e-services from the start.

[3] SK ID Solutions, "Smart-ID," [Online]. Available: https://www.smart-id.com/. [Accessed: May 10, 2025].

[4] SK ID Solutions, "Mobile-ID," [Online]. Available: https://www.id.ee/en/mobile-id/. [Accessed: May 10, 2025].

Digital Literacy

This section presents the findings related to the first sub-research question: "*How does digital literacy impact the integration of newly arrived refugees, and what factors influence their digital literacy development in Estonia?".* Three key themes emerged from the focus group interviews: **previous experience**, **training opportunities**, and **self-learning**. These themes capture the different ways through which digital literacy is developed and the ways it shapes the integration process. Each theme is presented with illustrative examples and participant reflections on their experiences and challenges.

5.1.5 Previous Experience

Digital literacy varied widely depending on prior exposure. Some participants from Ukraine had familiarity with tools like "DIIA[5]," while others lacked basic digital skills due to outdated educational practices (e.g., learning Word and Excel). A cultural preference for in-person communication in Ukraine contrasted sharply with Estonia's reliance on digital platforms. The focus group interviews revealed the following examples based on participants' past experiences with digital systems.

Focus group 1

Example 1: Speaker 3 had some exposure to digital systems in Poland but found Estonian systems more advanced and user-friendly.

Example 2: Speaker 2 contrasted Estonia's medical e-services with Ukraine's "DIIA" app, which was less developed in terms of medical records integration.

Focus group 2

Example 1: Speaker 6 compared Ukrainian and Estonian digital systems, noting that Ukrainian schools focused on outdated software like Word and Excel, which didn't prepare them for practical e-service use.

[5] Ministry of Digital Transformation of Ukraine, "Diia: The state and me." [Online]. Available: https://diia.gov.ua/. [Accessed: May 10, 2025].

Example 2: Speaker 4 highlighted differences in cultural habits, with Ukrainians preferring in-person interactions and Estonians relying heavily on digital systems.

5.1.6 Training Opportunities

Both groups mentioned adaptation courses as helpful but insufficient. Training programs often came too late or lacked depth, leaving participants to rely on informal self-learning. Suggestions included more frequent, targeted digital literacy courses that focus on practical applications. The following example highlighted participants' experiences with training opportunities.

Focus group 1

Example 1: Speaker 7 attended an adaptation course covering basic computer use and found it helpful in learning to access medical and job portals.

Example 2: Speaker 6 mentioned being unable to access similar courses in Estonia due to language barriers and being told to prioritize learning Estonian first.

Focus group 2

Example 1: Speaker 8 found adaptation courses useful but attended them six months after arrival, limiting their immediate impact.

Example 2: Speaker 9 mentioned that older individuals and those from rural areas struggled more with digital literacy, emphasizing the need for targeted programs.

5.1.7 Self-Learning

Informal networks, such as Ukrainian community groups or friendships, played a significant role in helping refugees navigate digital systems. Both groups acknowledged the importance of peer support but stressed the need for more structured assistance. From a self-learning standpoint, participants shared the following examples.

Focus group 1

Example 1: Speaker 5 relied on Ukrainian groups on Telegram for help, indicating the role of peer networks in learning to navigate e-services.

Example 2: Speaker 3 figured out how to use Smart ID independently, highlighting the self-reliance required due to insufficient formal support.

Focus group 2

Example 1: Speaker 2 proposed creating a centralized resource with tailored information for refugees, covering topics like family doctor registration and clinic options.

Example 2: Speaker 8 recommended early access to adaptation courses, rather than several months after arrival, to help refugees navigate e-services from the start.

Challenges using Estonian e-services

This section presents the findings related to the second sub-research question: "*What are the main challenges among newly arrived refugees when using Estonian e-services?".* Three key themes emerged from the focus group discussions: **system complexity**, **technology access**, and **support gaps**. These themes reflect the most commonly mentioned obstacles that participants faced when interacting with digital public services. Each theme is outlined with supporting examples and descriptive sentences or quotes that illustrate the practical difficulties encountered by newly arrived refugees in their everyday use of e-services.

5.1.8 System Complexity

Refugees faced significant challenges navigating complex systems like Smart ID and Mobile ID. Instructions were often unclear, and participants struggled with issues like obtaining card readers or resolving technical errors.

Multiple redirects and poorly structured websites made processes like registering for courses or accessing embassy services frustrating. System complexity was a recurring theme, illustrated by the following examples.

Focus group 1

Example 1: Speaker 5 described struggling to install and use Smart ID on a new phone, requiring multiple trips to the bank for assistance.

Example 2: Speaker 2 mentioned difficulties with cancelling bookings due to mismatched name input formats, which took several attempts to resolve.

Focus group 2

Example 1: Speaker 4 struggled with Smart ID setup on a new device, facing unclear instructions and difficulties obtaining a card reader.

Example 2: Speaker 5 mentioned issues with navigating embassy-related e-services, encountering multiple redirects and confusing processes.

5.1.9 Technology Access

Access to essential tools (e.g., updated smartphones, card readers) was a recurring issue. Many participants lacked familiarity with the devices or struggled to acquire necessary hardware.

Financial constraints often compounded these difficulties, particularly for older refugees or those with limited technical backgrounds. Participants shared examples related to technological access and cost considerations.

Focus group 1

Example 1: Speaker 6 experienced barriers related to outdated or broken devices, preventing smooth use of e-services.

Example 2: Speaker 7 shared how some refugees could not access digital tools due to limited computer access, particularly among older users.

Focus group 2

Example 1: Speaker 6 noted difficulties finding and understanding the usage of tools like card readers for Smart ID.

Example 2: Speaker 5 discussed challenges due to reliance on outdated devices or lack of familiarity with essential technology.

5.1.10 Support Gaps

Both groups reported limited access to reliable technical support for e-services. Refugees often relied on friends or trial-and-error approaches to resolve problems. Inconsistent or outdated information on official websites led to further confusion, delaying access to

critical services. Several participants described challenges stemming from the lack of dependable support when using e-services.

Focus group 1

Example 1: Speaker 5 noted that adaptation courses provided only general information, leaving many specific questions unanswered.

Example 2: Speaker 3 Jekateryna pointed out that there is no systematic support for troubleshooting technical issues, leaving users reliant on informal networks.

Focus group 2

Example 1: Speaker 2 relied on friends already living in Estonia for guidance, indicating the critical role of informal networks.

Example 2: Speaker 7 emphasized the help received from fellow Ukrainians and Estonian hosts in understanding local e-services.

5.2 Summary of key themes

The most prominent theme across both transcripts was language barriers, with a total of 18 references, indicating that language remains a significant obstacle in accessing and using Estonian e-services. This was followed closely by system complexity and support gaps, each referenced 17 times, reflecting participants' struggles with navigating complex digital platforms and the lack of adequate support when using them. User guidance also featured strongly with 15 references, showing a clear need for more intuitive design and accessible instructions. Training opportunities and community support were each mentioned 13 times, emphasizing the role of both formal training and informal networks in building digital literacy. Meanwhile, personalization, technology access, and previous experience were moderately discussed, each with 11 references, suggesting that individual backgrounds and availability of devices and internet access significantly shape the ability to engage with e-services. Furthermore, the analysis revealed that both *tootukassa.ee* and *tervisekassa.ee* present significant usability challenges for newly arrived refugees, particularly due to unclear navigation and fragmented information. While the services offer essential functions, their structure and design often hinder

independent use, reinforcing the need for more user-friendly and accessible digital platforms.

Table 2 presents the results of the thematic analysis conducted on two focus group transcripts, highlighting the frequency of key themes that emerged from discussions with newly arrived refugees in Estonia.

Themes	Transcript 1	Transcript 2	Combined Total
Language Barriers	10	8	18
User Guidance	8	7	15
Personalization	6	5	11
Previous Experience	5	6	11
Training Opportunitie	7	6	13
Community Support	6	7	13
System Complexity	9	8	17
Technology Access	5	6	11
Support Gaps	8	9	17

Table 1 Focus groups thematic findings

5.3 Comparative review of two Estonian public e-services

Along with examining focus group data, the author conducted an evaluation of the tootukassa.ee (Estonian Unemployment Insurance Fund) and tervisekassa.ee **(**Estonian Health Insurance Fund**)** websites to analyse their accessibility and usability through the lens of service design [30] [31]. This evaluation applies a five-principle service design framework, previously introduced in this thesis, —value co-creation, design research, user experience, learning, and citizen engagement—to assess two key Estonian e-service platforms: *töötukassa.ee* and *tervisekassa.ee*. The goal is to identify how well each platform reflects human-centered design principles and meets the needs of newly arrived users. This evaluation was not meant to serve as a usability assessment, but instead as a pragmatic investigation to gain a clearer understanding of the challenges mentioned by the participants.

The focus group interviews highlighted two notable Estonian e-service websites: tookassa.ee (Estonian Unemployment Insurance Fund portal) and terviseportaal.ee (Estonian Health Insurance Fund). Participants expressed various experiences and difficulties concerning their accessibility, usability, and function in the integration process.

To guarantee a systematic evaluation of e-service platforms, a five-point rating scale (1-5) was utilized for all service design criteria. This scale indicates how well each platform matches to the principles of service design [23].

A score of 1 (Very Poor) signifies that the platform lacks any indication of meeting the specific criterion, showing major obstacles or a total lack of supportive elements. A score of 2 (Weak) indicates that although some basic functionality might be present, it is poorly structured, ineffective, or fails to adequately satisfy user requirements. A score of 3 (Average) indicates that the platform satisfies fundamental expectations but is deficient in polish, user-focused enhancement, or simplicity, leading to a satisfactory yet uninspiring user experience. A rating of 4 (Good) indicates that the platform effectively meets the criterion, providing practical and user-friendly solutions that improve usability and accessibility. Ultimately, a score of 5 (Excellent) signifies exceptional practice, where the platform showcases outstanding design, successfully meets various user requirements, and acts as a benchmark for inclusive, user-focused service delivery.

This scale offers a practical, qualitative assessment to emphasize the advantages and disadvantages of each platform and to evaluate their conformity with contemporary service design principles

5.3.1 Estonian Unemployment Insurance Fund portal

Participants expressed various issues regarding their experience with tootukassa.ee, especially concerning language assistance, complicated navigation, and challenges in accessing essential functions like course enrollment or job postings. A review of töötukassa.ee was carried out utilizing a service design framework that highlights value co-creation, design research, user experience, learning, and citizen participation [23]. The examination reveals both operational advantages and significant deficiencies in user-focused service provision, especially from the viewpoint of a first-time or non-native user.

The following table provide an assessment of tootukassa.ee (Estonian Unemployment Insurance Fund) platform. The evaluation relies on a five-principle service design framework, employing a qualitative 1-5 scale to show how effectively website tackles value co-creation, design research, user experience, learning assistance, and citizen involvement. Each score is accompanied by a brief explanatory note to clarify the reasoning behind the assessment.

Criteria	Score (1-5)	Comments
Value Co-Creation	2	Simple feedback prompt exists. User groups recognized in navigation, but no participatory features for co-creation.
Design Research	3	Meets basic information needs but lacks structured task flows. No “Start here” or guided support for new users.
User Experience	3	Visually clean homepage. However, content is text-heavy. Family doctor search process is confusing for new users.

Learning	3	FAQ section and contact options available, but lacks interactive tutorials or onboarding. Static learning resources only.
Citizen Engagement	4	Feedback option present. “Normal to Contrast” accessibility feature. WCAG 2.1 AA compliance. Available in Estonian, English, Russian.

Table 2 Estonian Unemployment Insurance Fund website evaluation

Value Co-Creation

The platform does not clearly facilitate value co-creation. There is no clear or readily available feedback system for users to provide comments on the service or assist in its improvement. Although users can establish accounts and customize settings, there are no apparent avenues for active involvement or joint enhancement of the e-service.

Design Research

There is no organized onboarding procedure or user-friendly pathway that assists users with common tasks like registering as unemployed or applying for training. Information is delivered based on institutional logic instead of user requirements, and finishing tasks frequently necessitates prior understanding of the system's operation.

User Experience

The labels and interface components are clearly articulated. However, the system fails to clearly indicate that users need to log in to use services, and locating essential features—such as scheduling a consultation or submitting an application. The absence of visual cues, can elevate the cognitive burden for users. Nonetheless, the site offsets this by providing a chatbot assistance, which features the ability to start screen sharing with a consultant, enabling users to obtain real-time help in task completion. This functionality acts as a helpful support resource and improves the platform’s usability for users who can utilize it. The chatbot is capable of communicating in Estonian, English, and Russian. However, the initial interface prompt requiring the user to enter a message appears only in Estonian, which may create confusion for users who do not speak the language. Notably, the platform states its compliance with the WCAG 2.1 accessibility standard**,**

which is visibly acknowledged on the homepage. However, since new version of WCAG 2.2 accessibility standard is available but not yet applied to the site [32].

Learning

The website does not have specific onboarding resources, including tutorials, interactive guides, or instructional videos. The primary learning resource is the chatbot, and although it can advance to live screen sharing, it doesn't offer self-guided learning materials. There is no apparent FAQ available to assist new users in comprehending the layout of the e-service or managing typical procedures. There is no apparent guidance on how to use the chatbot for assistance, although once engaged, the chatbot effectively guides users through information and tasks step by step. This restricts chances for self-directed digital education.

Citizen Engagement

User involvement continues to be mostly passive. The platform conveys information, yet it does not encourage active engagement or offer ways for feedback or public discussion. While accessible in Estonian, English, and Russian, a significant portion of the specific content like job advertisements and training details exists in file formats that cannot be translated.

Estonian Unemployment Insurance Fund portal tootukassa.ee offers vital services and incorporates an important live assistance option through chatbot and screen sharing. Nonetheless, the wider platform does not seem to provide a unified user experience, clear design, or learning assistance. Its design emphasizes system logic rather than user requirements, creating challenges particularly for digitally unskilled users and users who do not understand the administrative literature. Bringing the platform into closer alignment with service design principles would enhance its inclusiveness and efficacy, especially for first-time users.

5.3.2 Estonian Health Insurance Fund website

To gain a clearer understanding and contextualize the participants mentioned regarding digital healthcare information access, the author performed a walkthrough of the tervisekassa.ee website. A review Tervisekassa.ee was carried out using a service design framework that highlights value co-creation, design research, user experience, learning,

and citizen participation [23]. While tervisekassa.ee does not provide transactional e-services directly, it is vital in the user's overall public health service experience by offering access to important information and guidance. From a service design viewpoint, informational websites are essential service interaction points that impact user experience, affect decision-making, and decide if a citizen can successfully finish a process. Therefore, assessing its design, framework, and support elements aligns with service design methodology.

The following table provide an assessment of tervisekassa.ee (website for the Estonian Health Insurance Fund) platforms. The evaluation relies on a five-principle service design framework, employing a qualitative 1-5 scale to show how effectively website tackles value co-creation, design research, user experience, learning and citizen involvement [23]. Each score is accompanied by a brief explanatory note to clarify the reasoning behind the assessment.

Criteria	Score (1-5)	Comments
Value Co-Creation	2	Simple feedback prompt exists. User groups recognized in navigation, but no participatory features for co-creation.
Design Research	3	Meets basic information needs but lacks structured task flows. No “Start here” or guided support for new users.
User Experience	3	Website content is text-heavy. Family doctor search process is confusing for new users.
Learning	3	FAQ section and contact options available, but lacks interactive tutorials or onboarding. Static learning resources only.

Citizen Engagement	4	Feedback option present. “Normal to Contrast” accessibility feature. WCAG 2.1 AA compliance. Available in Estonian, English, Russian.

Table 3 Estonian Health Insurance Fund website evaluation

Value Co-Creation

The platform offers few chances for users to collaborate in creating value or impacting service design *Tervisekassa.ee* does include a simple feedback prompt at the bottom of most pages (“Did you find what you were looking for?”). The website identifies various user categories, such as Ukrainian refugees, families with kids, and individuals looking for dental services, as clearly indicated in the navigation labeled “For the individual.”

Design Research

The platform meets standard user requirements—like details on health insurance and healthcare access—but it is missing design features that capture the experience of a less skilled digital user. There is no "Begin here" button, no introductory assistance, and the registration process with a family physician is not divided into manageable or guided stages. This causes tension, particularly for individuals with little understanding of the Estonian healthcare system.

User Experience

The homepage is visually structured, but text-heavy and hard to navigate. There are many labels and headings, and while they are logically organized, they might confuse users who are not acquainted with administrative language. Though scheduling appointments or reaching out to the institution is fairly easy, locating a family doctor via the interactive map is challenging, especially when trying to verify if a doctor is taking on new patients.

Learning

The platform does not offer embedded learning support. There are no tutorials, tooltips, or chatbots to guide users step-by-step. However, it does include an easily accessible FAQ section and provides the option to submit questions directly to Tervisekassa, which is a

useful feature. Most support is presented in static written form, which may be sufficient for users with high literacy but raise a barrier for others.

Citizen Engagement

Tervisekassa.ee features a "Normal to Contrast" toggle on the homepage, allowing users to switch to a high-contrast mode designed to support visually impaired users. The site also states that it has been developed in accordance with the WCAG 2.1 accessibility standards [26]. The website features a straightforward feedback request at the bottom of many pages (e.g. “Did you locate what you were looking for?” with Yes/No/Partially options). The site can be accessed in three languages—Estonian, English, and Russian. Rights and entitlements are defined.

From a service design standpoint, tervisekassa.ee provides a organized yet information-rich experience, ideal for users who have a clear idea of what they seek. The site effectively organizes important content sections and offers multilingual access; however, it fails to assist users with complex tasks and support learning. Website can cause struggles for newcomers to navigate.

6 Discussions and recommendations

In the upcoming chapter, the findings from the focus group interviews will be examined in relation to the insights from the literature review. The chapter will address the main research question and sub-questions, interpreting the results and discussing their implications for the digital inclusion and integration of newly arrived refugees in Estonia.

6.1 Language and Administrative Barrier

Participants regularly reported having trouble navigating Estonian e-services because there were insufficient multilingual options, making language the most commonly mentioned barrier. This supports previous findings that highlighted linguistic accessibility as a crucial element of effective ICT-assisted integration for refugees [7]. Even well-designed digital platforms can become exclusionary without language support, as the

current study supports. The idea of administrative literacy proposed by Safarov in 2023 is also pertinent in this case because participants had trouble not only with language in general but also with bureaucratic terminology and structures, which further restricted their access to necessary services [13]. These difficulties show the significance of the principles of Citizen Engagement and User Experience, which demand participatory development procedures and language-inclusive design. Standardized design guidelines and support for multiple languages are two ways that the Digital Agenda 2030 supports this [24].

6.2 System Complexity

Participants said that Estonian e-services were hard to use, and system complexity and support gaps were also common. These outcomes corroborate those of Bartlett et al. (2021), who showed that more user-friendly and culturally appropriate tools can be produced through user-centered design, especially when refugees are involved in the co-creation of services [11]. Current e-services in Estonia frequently presume a high degree of administrative and digital literacy, which, according to Ekoh et al. (2023) might leave out vulnerable populations like senior refugees or people who haven't had much experience with digital devices [14]. The fact that refugees frequently encounter interfaces and bureaucratic systems that were not created with their experiences in mind is further supported by other studies [8] [9] [10] . Value Co-Creation and Design Research principles are directly related to these findings, which highlight the importance of involving refugees in the design process and firmly establishing services based on a thorough comprehension of user needs. Additionally, Estonia's approach encourages automation and AI-powered assistance to improve usability; however, it must guarantee that these advancements continue to be inclusive and user-friendly [24] .

6.3 Training and Community Support

Both official training and unofficial community support were regarded as important facilitators of digital engagement. This supports Díaz Andrade and Doolin's (2016) claim that digital literacy promotes integration and autonomy [16]. In order to access e-services, participants said they mainly relied on friends or community members, which indicated a lack of official training opportunities. Alam and Imran (2015) also caution that, even if

technology access increases, digital exclusion may still result from skill gaps [15]. Pottie and others additionally emphasize that digital literacy lowers the possibility of false information and makes it possible to understand accurate information, which is particularly important for recently arrived refugees [17]. By highlighting the necessity of continuous, user-informed training initiatives, these insights draw attention to the Learning and Adaptation and Citizen Engagement principles which is The Digital Agenda 2030's central component of cross-sector cooperation between NGOs and government organizations can help to make these support networks possible [24].

6.4 Background, Technology Access, and Personalization

Access to technology, background, and personalization were not the most prominent themes, but they also influenced how refugees used digital services. Participants reported that navigating Estonian platforms was made easier for them by having a smartphone or by having prior experience with Ukrainian e-government tools, like the "Diia" app. This result is consistent with studies showing Ukraine's digital infrastructure has both advantages and disadvantages [19]. Despite Ukraine's notable advancements in digitization, issues like disjointed platforms still exist [20]. Similar research on Ukraine's Diia platform reveals that users continue to encounter difficulties with language, literacy, and usability even with simplified services [20] [21]. These observations underline the value of flexible systems that take into account users' prior experiences and access levels, which is consistent with the User Experience principle [22]. The Web Content Accessibility Guidelines (WCAG) 2.2 must be integrated to guarantee accessibility and inclusivity over the long term. For the purpose of creating inclusive digital environments, particularly for users with disabilities, these guidelines offer particular criteria, including operability, understanding ability, and robustness [26].

6.5 Recommendations

This study has several design implications for enhancing the usability and accessibility of Estonian e-services for Ukrainian refugees. First and foremost, multilingual interfaces need to be enhanced and expanded to include culturally sensitive language usage in addition to translations. Second, user-tested and simplified interface designs should to be put into practice, perhaps in accordance with co-design techniques and human-centered

design principles. Third, training courses ought to be provided in a variety of languages and formats, including online, in-person, and by local associations and NGO’s. Finally, platforms should be able to provide tailored onboarding experiences that change according to the user's experience with comparable services, digital skills, and background. Particularly Value Co-Creation, Learning and Adaptation, and Citizen Engagement, these recommendations are in line with all five of the guiding framework's principles [23]. Furthermore, incorporating aspects of WCAG 2.2 and the Estonian Digital Agenda 2030 will guarantee that these services are both extensively available and technologically sophisticated [25] [26].

7 Study limitations and future work

This research has several limitations that shape its scope and interpretation. First, the study relies on focus group interviews with a specific group of newly arrived refugees from Ukraine. While these insights are valuable, they may not fully capture the diversity of experiences among all refugees in Estonia, particularly those from different cultural or linguistic backgrounds. Additionally, the findings are based on self-reported data, which can sometimes include biases, inaccuracies, or incomplete reflections, as participants share their personal experiences and perceptions.

Language and translation posed another challenge, as some participants expressed themselves in languages other than the researcher's primary language. However, translation was use in the interview process subtle nuances being lost or misinterpreted during the translation and analysis process. The research also represents a snapshot in time, capturing refugees' experiences within a specific timeframe. As a result, it may not fully account for how integration challenges and digital engagement evolve over longer periods. The geographical focus on Estonia adds another limitation, as the findings may not apply universally to countries with different e-service infrastructures or integration policies.

This research examined the experiences of recently arrived Ukrainian refugees in Estonia concerning the availability and functionality of certain public e-service platforms. Future studies might broaden this focus by including additional refugee groups, like those from varying cultural or linguistic backgrounds, to examine if comparable challenges exist among different user populations. Furthermore, a more thorough assessment of other essential Estonian e-services (for example: tax system, educational platforms) would offer a wider perspective on systemic obstacles. From a methodological view, subsequent research could gain from more extensive usability testing, involving task-oriented observations and eye-tracking, to achieve deeper understanding of user behaviour and interaction challenges. Additionally, long term research could evaluate the effects of digital literacy programs or enhancements in service design on the integration of refugees over a period.

8 Summary

This study explored how Estonian e-services can be improved to better support newly arrived refugees, focusing on their experiences, challenges, and the role of digital literacy in their integration. Through focus group discussions with refugees from Ukraine, the research uncovered valuable insights into the barriers they face and identified practical steps to enhance accessibility and usability.

Refugees arriving in Estonia often encounter significant obstacles in using e-services. Language barriers are a recurring issue, while translation tools like Google Translate are frequently used, they are often inadequate for navigating complex systems. Digital literacy emerged as another critical factor. Many refugees come from educational backgrounds where outdated tools like Word and Excel were emphasized, leaving them not prepared for Estonia's advanced digital infrastructure. Support systems play a vital role in helping refugees bridge these gaps. Informal networks, such as friends and community groups, are the primary sources of guidance, but they cannot fully replace structured assistance.

In conclusion, the research underscores the need for changes to make Estonian e-services more accessible and inclusive. By improving language accessibility, offering timely training, simplifying systems, and leveraging both formal and informal networks, Estonia can empower refugees to integrate more effectively and participate fully in society. This study provides a roadmap for creating a digital environment that supports and uplifts those who are rebuilding their lives in a new country.

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10. Appendices

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Appendix 2 – Research Focus Group Guide

Duration:

Each focus group session will last approximately 1 h - 2 hours.

Researcher will lead the discussion with a translator, ensuring that the conversation remains on topic and that all participants have the opportunity to speak.

Discussion Guide:

Introduction and Warm-Up (5-10 minutes):

- Brief introduction about the the purpose and aim of the study.
- Ground rules for the discussion are set (e.g., respect for others' opinions, confidentiality).
- Participants introduce themselves.
- General questions about participants' experiences in Estonia (not directly related to digital literacy) to build comfort.

Main Discussion (50-60 minutes):

RQ: How does the digital literacy of newly arrived refugees affect their integration in Estonia?

Experiences with Digital Literacy:

- Can you describe your experience with using digital technologies in Estonia?
- How has your ability (or inability) to use digital tools impacted your daily life in Estonia?

Comparison with Previous Experience:

- How does the digital environment in Estonia compare to what you were used to in your home country or previous country of residence?

Digital Literacy and Social Integration:

- In what ways do you think digital literacy has affected your social interactions and connections within the Estonian community?

SRQ1: What factors affect the integration of immigrants' digital literacy in Estonia?

Identifying Key Factors:

- What do you believe are the key factors that influence how well newly arrived refugees can use digital technology in Estonia?

Are there any specific cultural, linguistic, or educational factors that you think impact digital literacy?

Support Systems:

- What kind of support (if any) have you received to improve your digital skills in Estonia? How effective has this support been?

SRQ 2: What are the main challenges amongst newly arrived refugees in using Estonian e-services?

Challenges with E-services:

- What challenges have you faced when using Estonian e-services?
- Are there specific e-services that are more challenging to use than others?

Language and Usability:

- How does language play a role in your ability to access and use e-services?
- Are there any changes or improvements that you think could make these e-services more accessible for you and other refugees?

Additional Questions to Support Digital Literacy Improvement:

Suggestions for Improvement:

- What kind of training or resources do you think would help improve your digital literacy skills?
- Are there specific areas or skills in digital literacy that you would like to learn more about?

Feedback on excisting oportunities:

- Are you aware of any existing programs aimed at improving digital literacy for refugees in Estonia? If so, what has been your experience with them?

Conclusion (10-15 minutes):

Summarize key points discussed.

Asking participants have any final thoughts or anything else to share.

Thank participants for their time and contribution.

Appendix 3 – Consent form for participants

The participants were provided consent forms in English and in Russian language.

Consent Form for Participation in Research Study

Title of Research Project "Digital Literacy and Integration of Newly Arrived Refugees in Estonia"

Researcher's Name:

Description of the Study:

As a participant, you will be asked to engage in a focus group discussion with other refugees. The discussion will last approximately 1.5 to 2 hours and will cover topics such as your experiences with digital technology, challenges in using Estonian e-services, and suggestions for improving digital literacy among refugees.

Voluntary Participation:

Your participation in this study is entirely voluntary. You have the right to withdraw at any time.

Confidentiality:

All information you provide will be treated confidentially. Your identity will not be revealed in any reports or publications resulting from this study. The focus group will be audio-recorded for research purposes, and the recording will only be accessible to the research team.

Consent:

I have read and understood the above information. I have had the opportunity to ask questions and have them answered satisfactorily. By signing this form, I agree to participate in this research study.

Participant's Signature: _____ Date: _____

Researcher's Signature: _____ Date: _____

Форма Согласия на Участие в Исследовательском Проекте

Название Исследования: "Цифровая Грамотность и Интеграция Вновь Прибывших Беженцев в Эстонии"

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Подпись Участника: _____ Дата: _____

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