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UNIVERSIDAD CATÓLICA
DE MURCIA

DOCTORAL THESIS

INTERNATIONAL DOCTORAL SCHOOL

Doctoral Programme in Social Science

Development of a Human-Public-Screen Interaction Framework

Author:

Jasmin Hilbig

Supervisor:

Dr. Rüdiger Buchkremer

Murcia, September 2025

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THESIS SUPERVISORS' AUTHORISATION FOR THESIS SUBMISSION

Prof. Dr. Rüdiger Buchkremer, as Supervisor of the Doctoral Thesis 'Development of a Human-Public-Screen Interaction Framework' by Ms Jasmin Hilbig in the Doctorate Programme Social Science, **authorise(s) its submission**, given that it meets the required conditions for its defence.

Which I hereby sign in compliance with Spanish Royal Decree 99/2011, of 28 January, in Murcia, on September 22, 2025.



ABSTRACT

Public screens are an integral part of public life, especially in urban environments. However, their potential appears to be under-researched, and a research gap exists between technological innovations and human motivation to use them. If it becomes clear which user needs can be satisfied, then more valuable and attractive content could be offered. To find out, this study examines psychological and sociological aspects that influence the motivation to interact with public screens. Following extensive qualitative theorizing, a survey was conducted in Germany (N=200) on fourteen potential motivators and five barriers. The study shows that autonomy, competence, and individualism are perceived as highly motivating, while data protection and the behavior of other users have negative effects. Based on the results, a human-public-screen interaction framework was developed that can be applied in both theory and practice. By closing the identified research gap, screens could become a more active, value-creating part of our digital public environment in the future.

KEY WORDS

Public Displays, Human-Public-Screen Interaction, User Experience, Human-Computer Interaction, Generational Differences, Digital-Out-Of-Home, Technology Acceptance, Mixed Methods.

RESUMEN

Las pantallas públicas son parte integral de la vida pública, especialmente en entornos urbanos. Sin embargo, su potencial parece estar poco investigado, y existe una brecha de investigación entre las innovaciones tecnológicas y la motivación humana para usarlas. Si se aclara qué necesidades de los usuarios pueden satisfacerse, se podría ofrecer contenido más útil y atractivo. Para averiguarlo, este estudio examina los aspectos psicológicos y sociológicos que influyen en la motivación para interactuar con pantallas públicas. Tras una extensa teorización cualitativa, se realizó una encuesta en Alemania (N=200) sobre catorce posibles motivadores y cinco barreras. El estudio muestra que la autonomía, la competencia y el individualismo se perciben como altamente motivadores, mientras que la protección de datos y el comportamiento de otros usuarios tienen efectos negativos.

Con base en los resultados, se desarrolló un marco de interacción entre humanos y pantallas públicas que puede aplicarse tanto en la teoría como en la práctica. Al cerrar la brecha de investigación identificada, las pantallas podrían convertirse en un componente más activo y generador de valor de nuestro entorno público digital en el futuro.

PALABRAS CLAVE

Pantallas públicas, interacción humano-pantalla pública, experiencia de usuario, interacción persona-ordenador, diferencias generacionales, publicidad digital exterior, aceptación de la tecnología, métodos mixtos.

ACKNOWLEDGEMENTS

This dissertation is dedicated with love to my grandmother, who, due to the hardships of war, never had the opportunity to pursue an education. Her strength and life story have always been a source of inspiration to me.

My deepest gratitude goes to my family and friends, who supported me in every possible way throughout this project. You endured my moods, regularly inquired about my progress, and constantly reminded me that you were proud of me. A very special thank you goes to my son, who was born six months ago. Although you deprived me of sleep, you also gave me endless energy. I am especially grateful to my husband, whose unwavering support, patience, and encouragement carried me through the most challenging phases of this journey.

I would also like to thank my supervisor, who was the one to motivate me to start this project in the first place. His encouragement and guidance have been essential in bringing this work to life.

Finally, I am grateful to my company for supporting me in this endeavor and for granting me the space and flexibility needed to complete this dissertation.

‘The man who asks a question is a fool for a minute, the
man who does not ask is a fool for life.’

Confucius (approx. 551 BC; † 479 BC).

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ACRONYMS AND ABBREVIATIONS

CASA, Computer as Social Actors

CSW, Computer Supported Cooperative Work

DOOH, Digital-Out-of-Home

E.G., Example given

Gen, Generation

HCI, Human-Computer Interaction

HPSI, Human-Public-Screen Interaction

ID, Identifier

NFC, Near Field Communication

Nr., Number

Ref., Reference

SDT, Self-Determination-Theory

UTAUT, Unified Theory of Acceptance and Use of Technology

UW, User Willingness

UX, User Experience

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I – INTRODUCTION

I - INTRODUCTION

Digital displays today are part of our everyday life, occurring in private, business, and public surroundings. They inform, connect, advertise, and warn. Public displays (also known as Digital-Out-of-Home, DOOH) have become a substantial element of modern urban environments with increasing functionalities. They can provide many helpful features in that dynamic environment, such as rerouting traffic, supporting the search for criminals, or displaying news. There is a broad research field related to improving screen usage, such as monitoring security aspects (Lasrado et al., 2021).

Social living spaces have become increasingly digital and smarter, with new networks for sharing data (Jin et al., 2014). Researchers such as Ringenson et al. (2017) predict that people will continue to move into cities and create new urban areas (Ringenson et al., 2017). One primary research objective is related to public digital screens as part of the growing Digital-out-of-home market (Schmid, 2020).

Nevertheless, there exists no sufficient theoretical foundation to understand the relation and interaction between such public screens and humans. While there is significant technological progress and research on its applications, such as gesture control, there is a lack in other essential disciplines for a comprehensive exploration. The psychological and social factors that influence interaction between humans and technology are still underrepresented in research concerning public displays.

For decades, research related to the established field of Human-Computer-Interaction (HCI), "[...] in which psychology and other social sciences play a vital role, it goes hand in hand with computer science [...]" exists (Olson & Olson, 2003). This combination of research fields appears to be the most expedient for exploring the relationship between humans and computers, and it should be applied to Human-Public-Screen-Interaction.

This thesis aims to define Human-Public-Screen Interaction (HPSI) as a dedicated new research field and reveal the described research gap.

The goal is to develop a framework that serves as a guideline and an empirically founded basis for future research and practitioners in application and content design. The framework provides the main motivators and barriers combined with some sociocultural influencing factors.

The methodology of the thesis employs various approaches to develop a motivation model that can be tested in a quantitative study. First, well-established psychological models were analyzed regarding their applicability to HPST. These include Maslow's research about human needs (1943), which describes a hierarchy of needs starting with physiological aspects, such as hunger, and culminating in self-actualization. Moreover, the Self-Determination Theory by Dec and Ryan (1985) postulates autonomy, competence, and relatedness as human basic needs. The Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) is the youngest analyzed model, identifying different key drivers for technology use.

All models have been compared and combined, resulting in a first version of the Human Motivation Model. For further development and a broader research foundation, literature from generational research was analyzed in addition. Insights into the drivers of different generations have been integrated, and a second motivation model has been created.

Following the mixed-methods approach after the literature analysis, a quantitative study has been implemented (Creswell, 2014). Four experts from different professional disciplines, including C/UX design, media, and urban development, were interviewed to validate previous assumptions and enrich the motivation model with their knowledge and experience.

The last methodical step in this thesis was the quantitative survey with 200 German participants. To create the questionnaire, a final version of the Human Motivation Model was built. Therefore, the previous model has been validated by the expert interview results and adapted regarding its applicability on a question-based survey concerning public screens. As a result, fourteen motivators and five barriers have been translated into testable items.

The survey was then conducted after a multi-stage pretest procedure to ensure the validity and reliability.

The quantitative study revealed Autonomy, Competence, and Individualism as main predictors of the willingness to interact with public screens. Moreover, although not as strong as the motivators, the barriers — time, effort, data privacy, and other users' behavior — significantly impacted engagement intention.

Based on the insights from the mixed-methods study, the Human-Public-Screen Interaction Framework was designed. The framework includes recommendations for practitioners from media or city planning disciplines who want to create interactive content or applications to increase the use of public screens. There are suggestions on how to practically apply the found insight into interactive design strategies in the discussion part of the thesis.

For theorists, the gained insights can be used for further validation and expanding the study.

In summary, this thesis contributes to the delimitation and definition of Human Public Screen Interaction as a distinct research field. The insights generated in this field are empirically tested and enriched with theoretical and practical knowledge about motivators and barriers to Human-Public-Screen interaction. The developed framework serves as a broad foundation on which future research can explore different aspects with a deeper focus.

II – JUSTIFICATION

II - JUSTIFICATION

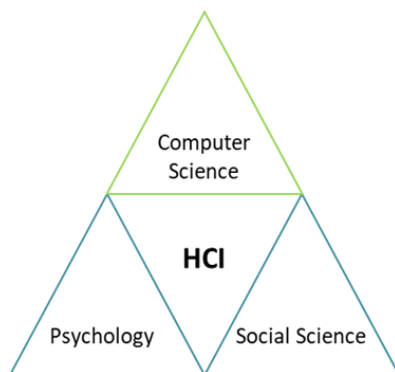
As shown in the introduction, current research is experimental and mainly related to the technical aspects of interaction with the screens. They measure their impacts by modifying parameters like technology, environment, or content. But what if there was first an investigation of psychological and social science insights regarding interaction motivators and barriers and an experiment based on that?

Two main aspects are underrepresented in that growing topic of public screens: harmonizing foundations of digital-out-of-home media and a view beginning from the recipient's eyes, with psychological insights, to understand better the relation with public screens and what influences humans' attention on it.

According to the definition in (Olson & Olson, 2003), Figure 1 shows the combination of the three research fields as part of Human-Computer Interaction studies: Computer Science, Psychology, and Social Science. In comparison, Figure 2 illustrates Human-Public-Screen Interaction as an analogous new research field that should have much in common with HCI.

But as explained before, the technical perspective (marked green) from Computer Science is predominant in current literature about Human-Public-Screen Interaction.

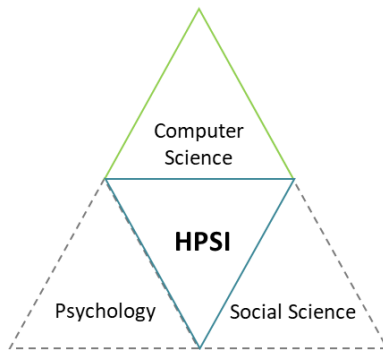
Figure 1: Human-Computer Interaction (HCI)



Author's elaboration.

The broken lines in Figure 2 indicate the missing influence of two relevant research directions for Human-Computer Interaction (HPSI):

Figure 2: Research gap Human-Public-Screen Interaction



Author's elaboration.

First, this thesis will define Human-Public-Screen Interaction as a research field in chapter 5.2, based on existing studies regarding public screens, public interaction, and Human-Computer Interaction.

In the further progress of this study, a psychological and social science foundation was established to generate a framework for Human-Public-Screen Interaction (HPSI). This framework could expand academic research in this field, and the outcomes may be helpful for practitioners to reach their audience more effectively.

III – OBJECTIVES

III - OBJECTIVES

In total, the following research goals were to be achieved:

- Provide a holistic understanding of Human-Public-Screen Interaction.
- Provide a foundation of psychology and social science insights for Human-Public-Screen Interaction studies.
- Develop an interaction framework for public screens.

The study focuses on determining how interaction with screens can be increased. Depending on the results, conclusions can be made about the impact of various usages. When the screen becomes more engaging for the recipient, cities and advertisers can capitalize on this increased attention. The aim is to create added value for advertisers, cities, and recipients. This thesis will provide a psychological and social science basis for this.

With the basis of the research objectives, the following research questions (RQ) for the study have been defined:

RQ 1: How can Public-Screen-Interaction be defined and delimited as a research objective?

Public Screens are part of a large and growing market. Especially in urban areas, people are increasingly confronted with them. There are numerous opportunities to utilize the screens for both advertising and social benefits. This fact highlights the need to establish a foundation of academic work in this field.

RQ 2: Which potential stimuli for interaction with public screens exist?

Based on insights from psychology, social science, and previous research in DOOH, interaction stimuli for public screens should be figured out and tested with different research methods.

RQ 3: Can stimuli increase public screen interaction in the long term?

To build an ongoing relationship between public screens and recipients, it is necessary to find out how to entice the audience in the long term. Therefore, the dissertation will investigate that question.

RQ 4: Which guidelines can be developed to build an interaction framework for interactive digital public screen usage?

As a result of the study, a framework will be proposed to provide a well-founded basis for the effective use of public screens.

IV – MATERIAL AND METHODS

IV -MATERIAL AND METHODS

This chapter outlines the scientific methods employed in the thesis. As the goal is to combine different qualitative and quantitative approaches, they will be detailed in subchapters 4.1.1 to 4.1.4. This design should leverage the strengths of each method to ensure a broad information setting and the empirical validation of the insights gained. Initially, the mixed-methods approach will be justified as the most effective approach for achieving the research objectives. Afterwards, the different methods and research steps will be described.

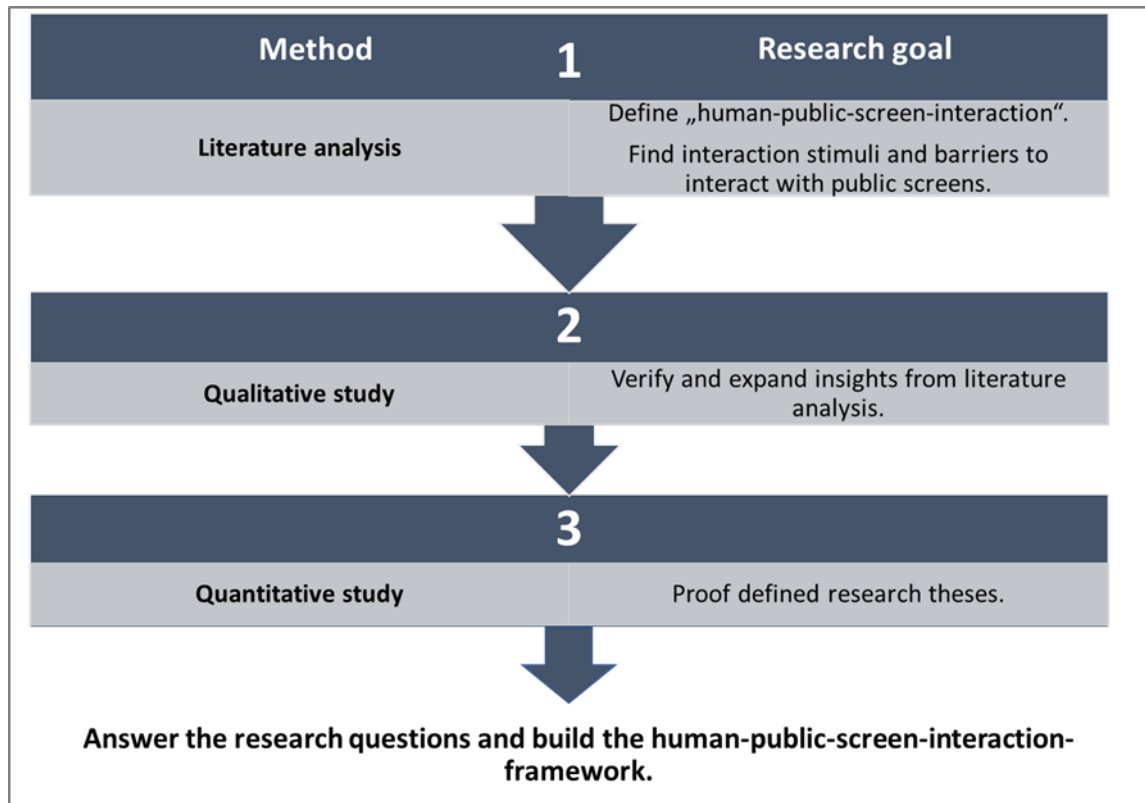
The final subchapter addresses the design of the HPSI framework, its purpose, and its intended applicability.

Through this structure, the study aims to generate findings that are both theoretically grounded and practically relevant for the development of user-engaging public screen applications.

4.1. MIXED METHODS APPROACH

According to Mayring (2001), a qualitative approach will be employed in this research to generate hypotheses about interactions with public screens, which will be verified through expert interviews. The final hypotheses will be tested through a quantitative study for generalization purposes. Figure 3 illustrates the different steps and summarizes the research goals for each method.

Figure 3: Mixed methods approach



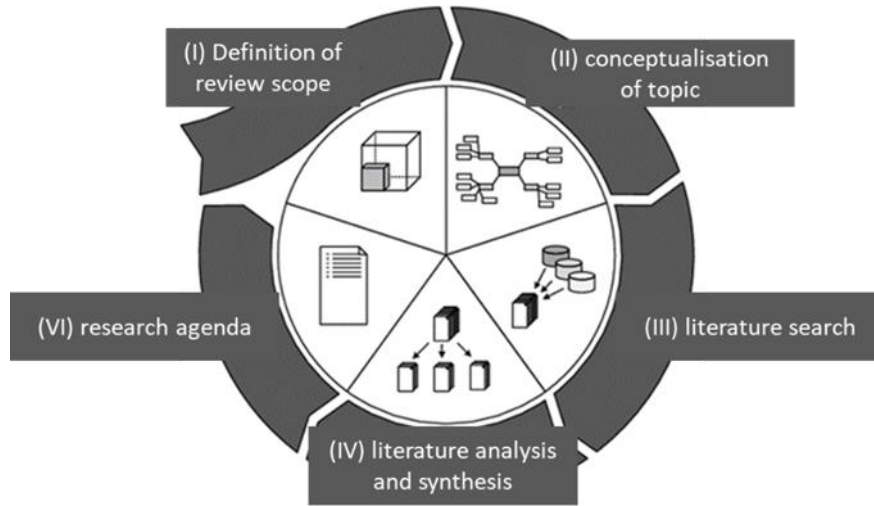
Author's elaboration.

A reason to choose a mixed-methods approach is to leverage the advantages of each method and combine them for a more comprehensive result (John W. Creswell et al., 2004). Besides the straightforward answers to the planned research questions, it is possible to find more effects by evaluating the studies' data and combining different insights.

4.1.1. Literature analysis

Literature analysis is necessary to build the foundation of the qualitative part. Therefore, this work follows the framework for a literature review as outlined by Vom Brocke et al. Vom Brocke suggests a five-step process to generate the research agenda from a systematic literature analysis:

Figure 4: Framework for literature review



According to vom Brocke et al (2009).

The following outlines the conceptualization (Phase II) of the topic, which will serve as the basis for further literature research (Phase III) in the thesis.

For the initial search, the following keywords and search strings, along with the platforms, were already tested with a filter from 2000 to 2021; see Table 1.

Table 1: Keywords and platforms

Search queries	Literature platforms
"digital signage"	ACM digital library (https://dl.acm.org/)
"digital signage" AND "interact*"	IEE Xplore (https://ieeexplore.ieee.org/Xplore/home.jsp)
"public screen"	Springer link (https://link.springer.com/)
"public screen" AND "interact*"	ScienceDirect (https://www.sciencedirect.com/)

Search queries	Literature platforms
"public display"	APAPsyncNet (https://psycnet.apa.org/home)
"public display" AND "interact*"	PubPsych (https://pubpsych.zpid.de/)
"public information system"	
"digital-out-of-home" OR "DOOH"	
"digital-out-of-home" OR "DOOH" AND "interact*"	

Author's elaboration.

Next, the results were screened regarding the journal's ranking based on <https://www.scimagojr.com/>. Table 2 shows the best results and the associated H-index.

Table 2: Selected search results

Platform	Result	H-Index	Field
ScienceDirect	Dennis, C., Joško Brakus, J., Gupta, S., & Alamanos, E. (2014). The effect of digital signage on shoppers' behavior: The role of the evoked experience.	195	Marketing
IEEE	Zhang, X., Xie, X., Wang, Y., Zhang, X., Jiang, D., Yu, C., & Liang, Y. (2020). A Digital Signage Audience Classification Model Based on the Huff Model and Backpropagation Neural Network.	127	Computer Science
IEEE	Vepsäläinen, J., Savolainen, P., Ojala, J., di Rienzo, A., Nelimarkka, M., Kuikkaniemi, K., Tarkoma, S., &	101	Pervasive Computing

Platform	Result	H-Index	Field
	Jacucci, G. (2016). Web-Based Public-Screen Gaming: Insights from Deployments.		
Springer link	Chen, J., Dourish, P., Hayes, G. R., & Mazmanian, M. (2014). From interaction to performance with public displays.	88	HCI
PsycNet	Olson, G. M., & Olson, J. S. (2003). Human-Computer Interaction: Psychological Aspects of the Human Use of Computing.	241	HCI

Author's elaboration.

The research fields for further investigation (phase III) will be identified by analysing the literature and its categorizations related to public screens.

The search with the queries from Table 1 shows only a few relevant matches at the databases APA PsycNet and PubPsych related to public-screen interaction. This reinforces the assumption that there is a research gap. It is, therefore, necessary to build fundamental psychological knowledge regarding humans' motivators and barriers to interaction with public screens. Finding the relevant subject categories in social science and psychology will be part of the literature analysis in the thesis. After completing the research subfields, relevant journals can be identified, and new search terms developed to detect related literature.

4.1.2. Systemic literature information retrieval

In addition to the manual literature analysis, the systemic taxonomy for information retrieval from literature (STIRL) will be applied to current research about public screens and interaction (Buchkremer et al., 2019). This approach uses machine learning and building clusters to give a broad overview of different subtopics.

4.1.3. Expert Interviews

The qualitative part will use the problem-centered interview model. It is best to verify the theses from the previous theoretical analysis (Mayring, 2016). As Mayring explains, this interview format is helpful if there is already a clear research focus and not just an explorative approach (Mayring, 2016).

The intended sample comprises practical and theoretical experts in Germany. This input will help us understand what may influence people's behavior from a more scientific view.

Experts with practical experience can share their opinions and knowledge from real examples and understand the business dimension and issues regarding public-screen interaction.

In sum, the qualitative study tries to catch a broad field of views and verify the theoretical insights to have the best preconditions to prepare the quantitative research. A qualitative study tests and expands the insights gained by the literature analysis. Therefore, it is a valuable instrument for this research.

4.1.4. Quantitative survey

After building a theoretical model about motivators for public screen interaction, a quantitative survey was implemented. The questionnaire aimed to identify which motivators influence interaction willingness. Moreover, it will verify the possible barriers that influence users' intention to interact with screens in public.

The sample frame includes only German participants because the research will focus on Germany's population and the German DOOH market (Floyd J. Fowler, 2014). Generation X, Y, Z, and Baby Boomers are relevant recipients.

Younger people under sixteen are excluded from the study due to the protection of minors during questionnaires. Moreover, the study does not include people older than the Baby Boomers because they are predominantly not technical.

There are different definitions in the literature about the exact birthdates of the generations that vary only in a few years, so the thesis will use Roth-Cohen et al. 2022 and Appelbaum et al. 2004.

The so-called “Baby Boomers” were born between 1947 and 1966 after the Second World War (Appelbaum et al., 2004).

Generation X includes people born between 1966 and 1980 (Roth-Cohen et al., 2022). Prensky explains that Generation X did not grow up with all the new technologies as Generations Y and Z; therefore, they are called *digital immigrants* (Prensky, 2001).

Millennials, or Generation Y, were born between 1981 and 1994. The last defined Generation is Z, the *mobile natives*, with a birthdate after 1995 (Roth-Cohen et al., 2022). It should be noted that no exact definition of generations and differences can be found in the literature. However, as the next generation, Gen Alpha, is usually named from the birth year 2010, Gen Z was defined up to and including 2009.

These two groups are described as technically proficient (Gurău, 2012). Since this research is about technical interaction items, it can be assumed that Gen Y and Z are particularly interesting for the study.

Even though the survey that follows later only refers to participants in Germany, it can be assumed that the generations are similar internationally (Cleaver et al., 2000). This means that the theses drawn here are obtained from international studies on generations and applied to Germany. It is possible that hypotheses in this dissertation do not align with German standards, but the survey would reveal this.

If only research on generational differences among Germans were used, the number of sources would be too limited. Moreover, it can be assumed that the countries and generations are comparable (Cleaver et al., 2000).

4.2. FRAMEWORK DESIGN

The framework aims to provide a profound base for practitioners and theorists. On one side, it should derive structured design implications for interactive public screen applications by identifying core motivational drivers.

Conversely, it should serve as a conceptual foundation for future research and developing hypotheses for Human-Public-Screen Interaction (HPSI) research.

This dissertation developed its structural model, inspired by Venkatesh et al.'s widely adopted Unified Theory of Acceptance and Use of Technology (UTAUT) in 2003. While the UTAUT focuses on general technology use in work environments, its structure served as a valuable reference for this framework. The UTAUT Model will be described in detail in Chapter 5.3.1.3.

The HPSI Framework aims to systematically present relevant psychological motivators, barriers, and influencing factors for interaction with public screens. The framework captures predictive motivators that have been empirically shown to influence interaction willingness, integrates barriers that may inhibit engagement, and accounts for moderating demographic variables.

V – RESULTS

V - RESULTS

This chapter includes the results of the applied mixed-method study in the thesis, separated into five sections. According to the process, the current state of research regarding public screens is explored and presented first (5.1). As further basic work, a research field definition of Human-Public-Screen Interaction is given by investigating related disciplines (5.2).

After these first steps, the literature analysis provides human motivational drivers and barriers from established research that will be applied to HPSI (5.3). These insights will be used to create a motivation model for further testing.

The qualitative study contains expert interviews with practitioners from different related disciplines. This part validates previous assumptions and gains insights from real-world experiences. All the derived assumptions about HPSI have been applied to a quantitative survey.

5.1. STATE OF RESEARCH

The following three subchapters provide an overview of existing research on public screens and interactions, as well as Human-Computer Interaction, to establish a basis for the subsequent definition of Human-Public-Screen Interaction.

The analysis of public screen and public interaction literature was conducted using a modern approach called the Systemic Taxonomy for Information Retrieval from Literature (STIRL) methodology (Buchkremer et al., 2019). The literature of Human-Computer Interaction was analyzed manually.

5.1.1. Public screens

This literature review is grounded in the Systemic Taxonomy for Information Retrieval from Literature (STIRL) methodology, initially proposed by Buchkremer et al. (Buchkremer et al., 2019). This approach offers a structured framework for managing a substantial volume of literature and extracting meaningful insights by applying machine learning and clustering techniques.

Initially, several reputable research portals were used to identify pertinent literature addressing digital screens in public spaces. This process identified "digital signage" and "public screen*" as the most relevant search queries, as illustrated in Table 1. These queries demonstrated a commendable balance between recall and precision. Building upon the previous research findings, it became clear that exhaustive coverage of every article is not imperative. Instead, focusing on abstracts proves sufficient, mainly when dealing with a large corpus of literature, as it yields comparable results to analyzing dozens of full-text articles.

Table 3: Search strings, databases, and hits

Search String	Database	Hits	Filter
("Document Title":"digital signage") OR ("Document Title":"public display") OR ("Abstract":"digital signage") OR ("Abstract":"public display")	IEEE	314	none
"digital signage" OR "public display" OR "digital signage" OR "public display" in Abstract	Wiley	85	Journals
"digital signage" OR "public display" OR "digital signage" OR "public display" in Title	Wiley	26	Journals
("Document Title":"digital signage")	SpringerLink	43	conference paper
("Document Title":"public display")	SpringerLink	47	conference paper
[[Title: "digital signage"] OR [Title: "public display"]] OR [[Abstract: "digital signage"] OR [Abstract: "public display"]]	ACM	303	none
Title, abstract, keywords: "digital signage" OR "public display" OR "digital signage" OR "public display"	Sciencedirect	123	Review articles, Research articles, conference abstracts
Total		941	
Total after data cleansing		811	

Author's elaboration.

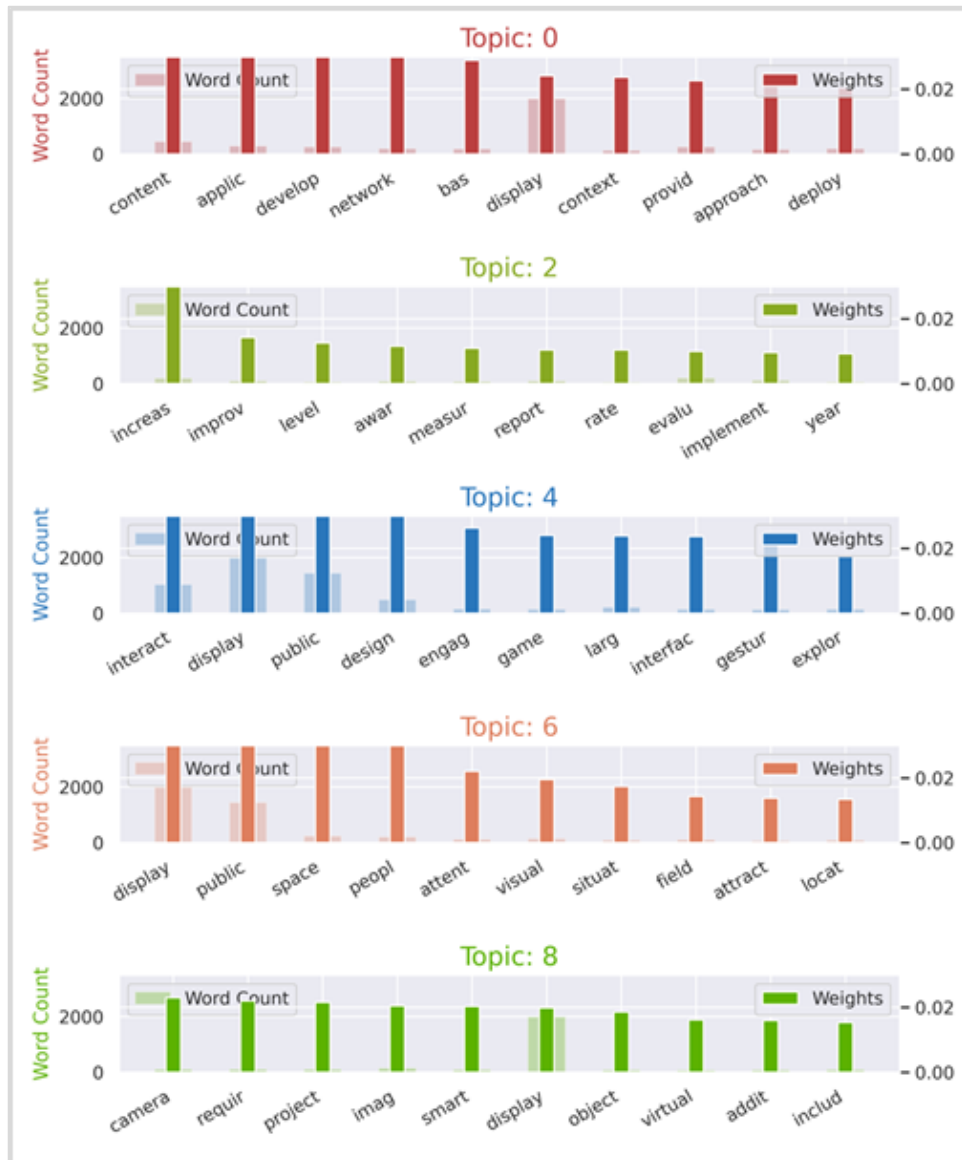
The number of hits has been reduced from 941 to 811 after data cleansing because of incomplete records or duplicates.

Stop words from this final text corpus have been removed, which reduces the terms to their primary form, as described in Weber 2022. Now the text data has been processed by parts of the natural language processing (NLP) toolset of the STIRL method (Buchkremer et al., 2019).

Figure 5 depicts the ten topics that appear to be most relevant. The number of clusters is chosen to be homogeneous. The dataset underwent data cleansing procedures, resulting in a reduction of hits from 941 to 811 due to issues like incomplete records or duplicates. Additionally, "stop words" were eliminated from the final text corpus, aligning with the methodology outlined by Weber and Buchkremer, which emphasizes reducing terms to their primary forms (Buchkremer et al., 2019; Weber & Buchkremer, 2022). This process enhances the quality and coherence of the dataset, preparing it for further analysis.

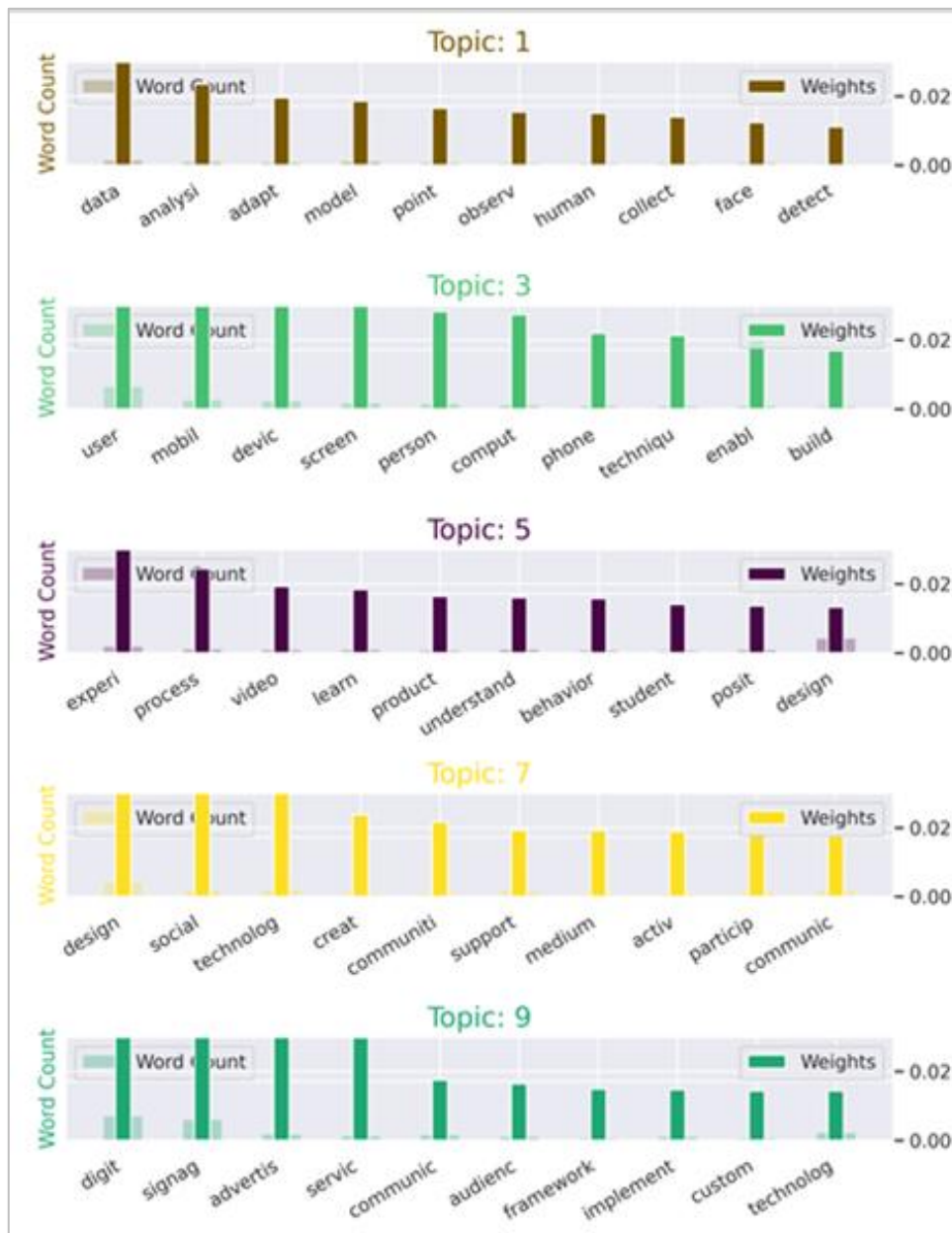
Moving forward, the text data was subjected to various components of the natural language processing (NLP) toolkit embedded within the STIRL methodology (Buchkremer et al., 2019). Figure 5 and 6 visually illustrates the ten topics deemed most relevant, with the number of clusters optimized to ensure homogeneity within the dataset. This step is crucial for organizing and interpreting the vast amount of information contained within the corpus, facilitating a more focused and insightful analysis.

Figure 5: Topic clusters and weights Part 1



Author's elaboration.

Figure 6: Topic clusters and weights Part 2



Author's elaboration.

The assigned research topic delves into gaming applications and the control of screens through gestures.

A notable trend has been observed since 2002, with a subsequent decline from 2019 onwards. The ability for interaction between mobile devices and screens has been made possible primarily due to technological advancements such as internet connectivity. This correlation is evident as articles focusing on mobile devices are often associated with the interaction cluster.

In a study conducted by Peltonen et al. (2008), the authors examined gesture-based interaction utilizing a multi-touch display within a city center context (Peltonen et al., 2008). Their experiment revealed valuable insights into the factors influencing interactions with public screens and the dynamics between users themselves. Such research endeavors shed light on the complexities of human-device interactions in public settings and contribute significantly to our understanding of this evolving field.

The articles about topic 5 delve into learning and education through screens. This thematic area scrutinizes both the comprehension and engagement with screen-based content. Notably, topic 5 has exhibited spikes of over 10 percent in scholarly attention during 1964, 2004, 2009, and 2018. Within this cluster, there is a prevalent focus on exploring the potential of learning through public displays.

Ahn et al. (2018) elucidate on this aspect, elucidating on how integrated learning systems can cater to the educational needs of young individuals across diverse settings (Ahn et al., 2018). Their research endeavors delve into such systems' efficacy and impact on learning outcomes. Furthermore, these studies highlight the role of public displays in fostering communal engagement, allowing users to share experiences and enabling parents and other stakeholders to enhance learning experiences within the community actively.

Within theme number 6, the literature explores the factors influencing the perception of public screens. This encompasses various aspects, including the situational context, geographical location, and the extent of people's attention directed towards the screens. Notably, 2003 to 2009 witnessed heightened scholarly interest in this subject within the corpus.

This thematic cluster bears similarities to cluster number 2, which primarily investigates the determinants of screen attention.

However, whereas cluster number 2 focuses on the escalation of attention, theme number 6 delves deeper into the broader influences shaping perceptions.

The prevalent use of words related to social dynamics characterizes topic 7, emphasizing concepts such as community and support. Throughout the years spanning from 2004 to 2017, these themes consistently surpassed the relevance threshold in the corpus. A recent study conducted in 2022 by Kang et al. (2022) delves into the utilization of monitors to facilitate social interaction within nursing homes (Kang et al., 2022). The findings underscore the residents' positive reception towards integrating displays as tools for interaction. Nevertheless, further research is warranted to explore the potential of such systems under varying conditions.

Theme 8 delves into intelligent virtual applications, cameras, and images. Notably, this thematic area has garnered increased relevance in 1987, 1993, and 2021 compared to other periods.

The final thematic cluster explores the advertising market and audience research, which has maintained a consistent presence since 2003. A notable study by Payne et al. (2006) exemplifies this theme, presenting a system designed to categorize passers-by using data from their Bluetooth devices. Subsequently, the system employs an auction-based approach to select display advertisements.

Table 4 below provides a succinct overview of the identified themes, accompanied by brief keyword descriptions and the years exhibiting the highest hit volume.

Table 4: Topics and temporal occurrence

	Keyword(s)	Most hits
Topic 0	content application	2002; 2010-2014
Topic 1	Analysing recipients	1966-2003; 2019-2022
Topic 2	Increasing awareness	>1987; 1996; 2004-2007
Topic 3	Mobile devices	1999-2011
Topic 4	Interaction	2002-2019
Topic 5	Learning	1964; 2004; 2009; 2018
Topic 6	Perception Influences	2003-2009
Topic 7	Social	2004-2017
Topic 8	Smart applications	1987; 1993; 2021
Topic 9	Advertising	2003-2022

Author's elaboration.

In summary, it can be stated that screens in public spaces represent a diverse and dynamic field of research that encompasses various aspects of human-machine interaction, education, perception, and advertising.

A key trend since 2002 has been the development of gaming applications and the control of screens through gestures. However, interest has been declining since 2019. The ability to interact between mobile devices and screens has been enabled by technological advances such as internet connectivity, leading to an increased focus on this topic.

Research into learning and education through screens, particularly public displays, is another area of focus. Here, the potential of screen use for learning processes is investigated, and there has been a continuous interest in this topic since 1964, with noticeable peaks in 2004, 2009, and 2018.

5.1.2. Public interaction

As part of this work, the field of public interaction was intensively investigated, and the results were published as a journal article (Schmank & Buchkremer, 2024). In this chapter of the thesis, the article's most important findings are presented to provide an overview of the current state of research.

The article of Schmank & Buchkremer used the systematic taxonomy for information retrieval in the literature (STIRL), combined with vom Brocke et al.'s review process (Buchkremer et al., 2019). They identified 546 relevant articles from the field of public interaction and processed all of their abstracts using a clustering algorithm. With that technology, the authors classified the articles into eight-word clusters that have been used to describe the content of the assigned articles.

What has to be emphasized is that this method generated a broad overview of occurring research topics in the field of public interaction, but does not cover cultural, political, or contextual differences between countries. As the articles outcome serves as a theoretical basis, a generalistic overview is suitable. The following will describe each found cluster and set it into a public screen application context.

1. Social media and Public interaction

The first cluster describes the influence of social media dynamics on public discourses and political communication. Researchers are working on using social media platforms to support dialogue and public participation.

Public screens could visualize content from social media and inspire people to discuss it in public spaces. They could connect the digital and physical spaces. On the other hand, such an application should be conceptualized carefully to avoid aggressiveness and provide a safe and fair communication space.

2. Data in urban spaces

This cluster explores the role of data and information in urban environments, especially regarding smart cities and the use of green spaces. The visualization and use of data to increase life quality in cities is a focus of this research field.

For example, real-time traffic or air pollution data could be displayed on public screens to support transparency and provide access to such information. On the other hand, they could provide people with hints on how to behave to influence their values – for example, walking instead of driving today to improve the air quality.

3. Governance, health, education

Research concentrates within this cluster on different governance structures and their impact on health and education, including system efficiency and equality of participant opportunities.

In education and health, public screens can convey relevant information and content, providing access to everyone and highlighting important topics.

4. Public intersectionality

This cluster concerns overlapping traffic, industry, humans, and the environment. There are analyses about the interaction between technology and environmental factors, especially regarding mobility and sustainability.

Public screens could serve as a medium between humans and other named topics, thereby strengthening awareness of sustainable solutions.

5. Group dynamics

The impact and influence of group dynamics on interactions are central to the articles mapped to this cluster. There is research on how Group communication and behavior are affected by environmental factors.

Applications on public screens could be used to initiate collective activities and encourage group dynamics in this way.

6. Complex systems

Studies from this cluster highlight how different systems show complex dynamics characterized by several elements, such as competition and cooperation. The information flow and availability of resources have a crucial influence on the interaction results of such systems.

For societies, there are insights into topics such as influencing public opinions. Public screens could support urbanization by informing people about local changes and infrastructure projects. Moreover, the screens could allow people to join questionnaires regarding shaping their living environment.

7. Public displays

This cluster focuses on different approaches to improve the usability of public screen applications, for example, by different control technologies. Moreover, there are studies about the effects of public screens on the environment.

As explained in the key findings of the cluster, interesting research fields are still unexplored, and no broad literature regarding the use and possibilities of public displays exists. This supports the relevance of this thesis and its research questions.

8. Politic and Public

The interface between public affairs, governance, and political systems is analyzed in this cluster. One key point of interest is the role of transparency and public involvement in political processes.

Political information campaigns and opportunities for citizen participation through votes could be promoted on public screens.

9. Service Management

Modern technologies and environment-friendly approaches in the design of public services are central in the literature belonging to the last cluster. Intelligent systems increase efficiency, transparency, and citizen participation, while sustainable technologies support the environment. A user-centered and ethical design might be practical in strengthening trust in public service management.

Public screens could be used as an interface to communicate public services without access limitations to this information. Moreover, they could provide citizens with information about current projects that support sustainability and environmental protection, and allow them to vote on different investment options.

5.1.3. Human-Computer Interaction

HCI has been established as a research field for a long time and is analyzed here purely by Vom Brocke et al. in a manual way (Vom Brocke et al., 2009).

A broad overview of the STIRL method is not needed here, since HCI is used here as a model for the HPSI concept (see Chapter II), which will be defined in Section 5.2.

The authors explain that human-computer interaction is an interdisciplinary field that primarily encompasses topics from three research fields: Computer Science, Psychology, and Social Science (Averbukh, 2021; Olson & Olson, 2003).

As part of Computer Science, Olson & Olson explain the importance of usability methods, accessibility, and expanded target groups. Over time, in addition to technical aspects, more and more social, cultural, and emotional dimensions were considered in research (Siricharoen, 2019).

Especially in public spaces, psychological constructs, such as social recognition, identification, and motivation, play a substantial role as interaction occurs in a social context. The well-known Computer as Social Actors (CASA) model describes that people react socially to computers as if they were in a human-human interaction (Nass et al., 1994). Recent literature expands that model as technology and humans have changed and developed more routines in daily interaction (Gambino et al., 2020), so a new independent social category has evolved. That means humans' expectations of interaction with technology are not only based on human communication but also on their experience with media.

The User Experience (UX) field has also been a significant development for HCI research. As Hassenzahl and Tractinsky argue, interaction cannot only be designed with a focus on efficiency but should address human needs as they seek to benefit from interactions (Hassenzahl & Tractinsky, 2006).

For public screen interaction, it can be assumed that users would perceive such screens not as passive interfaces but as part of the public social life. To achieve that, the motivational framework behind the interaction must be understood and applied to public screens. Therefore, this thesis will explore how people can be motivated to interact with public screens.

5.2. DEFINITION OF HUMAN-PUBLIC-SCREEN INTERACTION

The research findings from the previous chapters contribute significantly to shaping a definition of **Human-Public-Screen Interaction (HPSI)**.

This term refers to the interactions between individuals and public displays in different contexts, including education, advertising, social interaction, and social perception.

Based on the findings from the research, it can be stated that Human-Public-Screen Interaction shares its interdisciplinary roots with Human-Computer-Interaction.

- **Computer Science**, in terms of the systematic architecture, display technology, and interaction design.
- **Social Science** provides insights into human behavior.
- **Psychology** contributes to how people get motivated and how that influences their behavior.

In summary, Human-Public-Screen Interaction can be viewed as a multidimensional concept that explores the interface between humans and public screens in public environments, as well as the impact of these interactions on education, communication, advertising, social interaction, and perception.

In contrast to traditional screen-based interaction, HPSI is socially visible and unplanned. It requires the consideration of motivational factors in that context, which will be analyzed in the following section.

5.3. THEORETICAL FOUNDATION: LITERATURE ANALYSIS

Brignull and Rogers used experiments to gather findings regarding barriers and motivations for interacting with public displays (Brignull & Rogers, 2003). They set up a screen at a book launch party where people could share their opinions and comment on others' content. The interaction with the screen and other people was completely voluntary. The installation included initializing content, such as attractive images or provocative statements, to encourage people to initiate a digital conversation about the content.

They discovered that several factors can hinder people from initiating an interaction. First, there may be an environmental reason, as the area around the display is already crowded with too many people, so it is difficult for others to

observe and understand what is happening directly. Or they cannot comment on the screen keyboard because other people block it.

Moreover, the researchers explain that users' expectations regarding the application's usefulness and other users' opinions are essential when deciding whether they also want to participate. They also examine who has participated so far and how they behave. The barriers will be presented in subchapter 5.3.2.

In the following subchapters, the goal is to determine what people perceive as a benefit, why they might be willing to interact with a screen to obtain it, and what would prevent them from doing so. For this purpose, a literature analysis of various psychological approaches is conducted.

5.3.1. Psychological models

There are various theories about the motivation of people and their needs (Chulef et al., 2001)(Chulef et al., 2001; Deci & Ryan, 1985; Gollwitzer, 2018; Gollwitzer & Oettingen, 2015; Lindenberg & Steg, 2007; Maslow, 1943; McClelland, 1985).

The behavioral and social psychologist McClelland explains that there has been a change in the term *motivation* that expanded from *aroused motives* to a definition that includes arousal potential, probability of success, incentive value, and other variables (McClelland, 1985). In turn, he explains that motives, likelihood of success, and incentive value influence the impulse to act independently of each other.

In his study, he also confirms the thesis that the strength of a motive is the most essential factor for recurring behavior. In turn, the value of incentives has a more significant influence on rational decisions. According to McClelland, to predict the probability of action, the strength of the motive would have to be multiplied by the likelihood of success.

In this chapter, the focus is on potential stimuli for interaction with public screens. For this reason, reference is made below to models that represent human needs and motives. Therefore, the term *motivation* will be used due to different motives and needs.

The researchers Sheldon et al. initially drew up a list of ten needs that represent a synthesis of the theories of Maslow (1954), Deci & Ryan (1985), Derber (1979), and Epstein (1990) (Sheldon et al., 2001). They tested with samples from the United States and South Korea, categorizing the needs of the participants as most important and affecting, concerning both satisfying and unsatisfying experiences.

The study's four needs include autonomy, competence, relatedness, physical thriving, security, self-esteem, self-actualization, pleasurable stimulation, money-luxury, and popularity-influence.

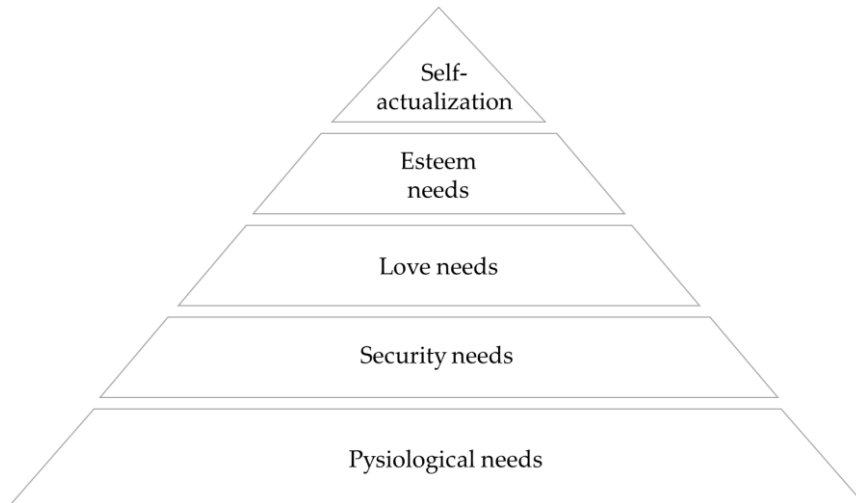
The results of the different tests in the paper of Sheldon et al. indicate that autonomy, competence, relatedness, and self-esteem have more impact on satisfaction than the other identified needs. In addition, they support Maslow's concept, assuming that people long for security and predictability when they are in an uncomfortable situation.

The following will describe the main contents of Maslow's and Deci & Ryan's theories. In addition, the unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003) will be presented and compared.

In the last subchapter, a synthesis and extension of the concepts will be presented to build hypotheses about motivations to interact with public screens.

5.3.1.1. *Human Needs by Maslow (1943)*

A well-known concept about the motivation of human needs is known in the work of Maslow (Maslow, 1943). He describes that people essentially want to satisfy five different categories of needs. The needs build on each other hierarchically, as shown in Figure 6.

Figure 7: Human Needs Hierarchy by Maslow

According to Maslow (1943).

Firstly, people strive to fulfill physiological needs such as hunger. Once a person has satisfied these basic needs, the desire for security emerges, which can be created through health and a particular world order and predictability. A job that covers your living expenses and a functioning health insurance system can also contribute to this.

Based on Western countries such as Germany, the average adult's physiological and safety needs are mainly satisfied. However, the topic of a sense of security is being discussed a little more again due to the COVID-19 pandemic, global warming, and the war in Ukraine.

The next level of desire is the need for love, the longing to be accepted, liked, and loved. We strive to belong to a group and to experience affection. Friends, family, and partners can fulfill this need.

A person who receives love in a sufficient form, for whom the pursuit of esteem becomes more important, to have esteem needs. Maslow divides this need into two subcategories. Firstly, the desire to rely on oneself and feel the strength to cope with life's hurdles. On the other hand, there is also the need to experience external recognition by appreciating and valuing what we achieve and who we are.

Self-actualization is the last level of Maslow's hierarchy of needs. It is about getting everything possible out of yourself and pursuing a meaningful activity.

However, Maslow also explains that there were limited scientific findings on this need at the time of his work (1943). Few people could fulfill the previous stages so satisfactorily that only self-actualization seemed worthwhile.

Maslow's concept was criticized later because it seems unsuitable in a universal view to explain human motivation, but it is also referred to by many researchers (Chulef et al., 2001; Deci & Ryan, 1985). Maslow's findings can be applied partially to the present work in combination with other theories.

5.3.1.2. *Self-Determination by Deci & Ryan (1985)*

A much more widely recognized theory, the "Self-Determination Theory" (SDT), was developed by the psychologists Edward L. Deci and Richard M. Ryan in 1985 (Deci & Ryan, 1985, 2008; Ryan & Deci, 2000). They also studied the motivation of human behavior. Their fundamental findings were:

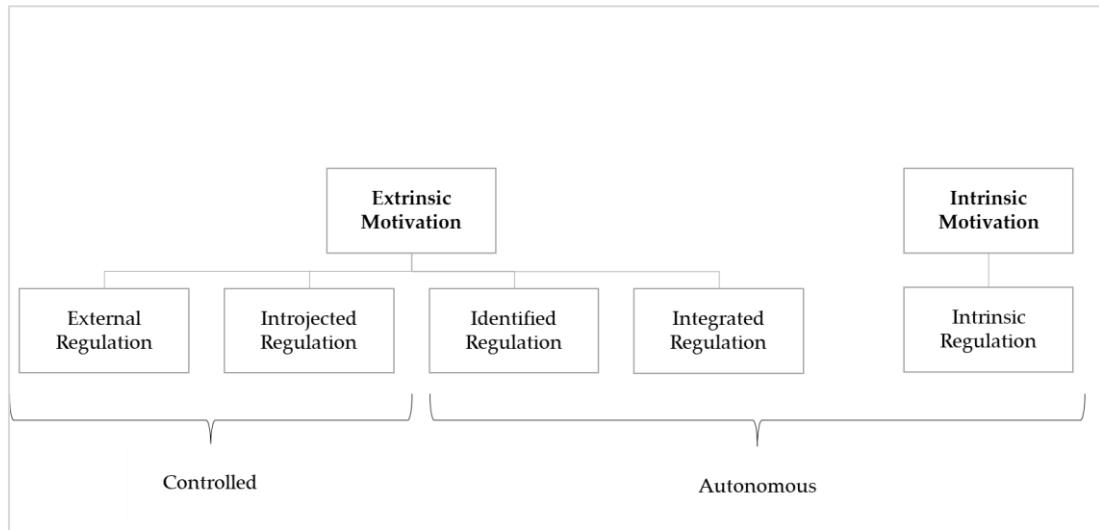
1. Basic needs

People have three basic needs that are significant for their motivation. They strive for autonomy, in other words, to decide and act self-determinedly. They also want to experience a feeling of competence, meaning to be capable and effective. People also like to form social bonds and feel a sense of belonging (relatedness).

2. Motivation types

There are two types of motivation: extrinsic and intrinsic. Intrinsic motivation comes from the inner self and is free from external pressure. Extrinsic motivation is the opposite and is generated by external influences. Figure 7 illustrates extrinsic and intrinsic motivation subcategories, sorted from left to right, in order of decreasing to high self-determination impact.

Figure 8: Extrinsic and Intrinsic Motivation by Deci & Ryan



According to Deci & Ryan (1985, 2000).

An action can be undertaken to avoid punishment or to receive the promised reward, which would be an external regulation of motivation. Introjected regulation occurs when humans behave to avoid feeling guilty or unsuccessful, for example. Even if this motivation has an internal part, its root is externally caused. Deci and Ryan explain that for that reason, some literature aggregates the two forms into one as controlled motivation (Ryan & Deci, 2000).

If the actor considers an action to be significant and thus accepts it, he can consider it personally essential and, according to SDT, would be regulated by identification. Lastly, the form of identified regulation has the highest self-determination in extrinsic motivation. It exists when regulation can be evaluated and brought into perfect harmony with personal values.

Personal reasons, such as enjoyment or interest, cause intrinsic motivation and have, therefore, no external regulation. According to Deci & Ryan (2000), some studies summarize the two last-mentioned external forms of motivation and the intrinsic one, as they contain a degree of autonomy in behavior. Moreover, they refer to studies that prove the correlation between autonomy and engagement, showing that engagement in behavior increases when autonomy does.

3. Amotivation

According to the researchers, people exhibit uncontrolled, aimless behavior in a state of amotivation, in the absence of any motivation (Ryan & Deci, 2000).

4. Influence of basic needs on motivation

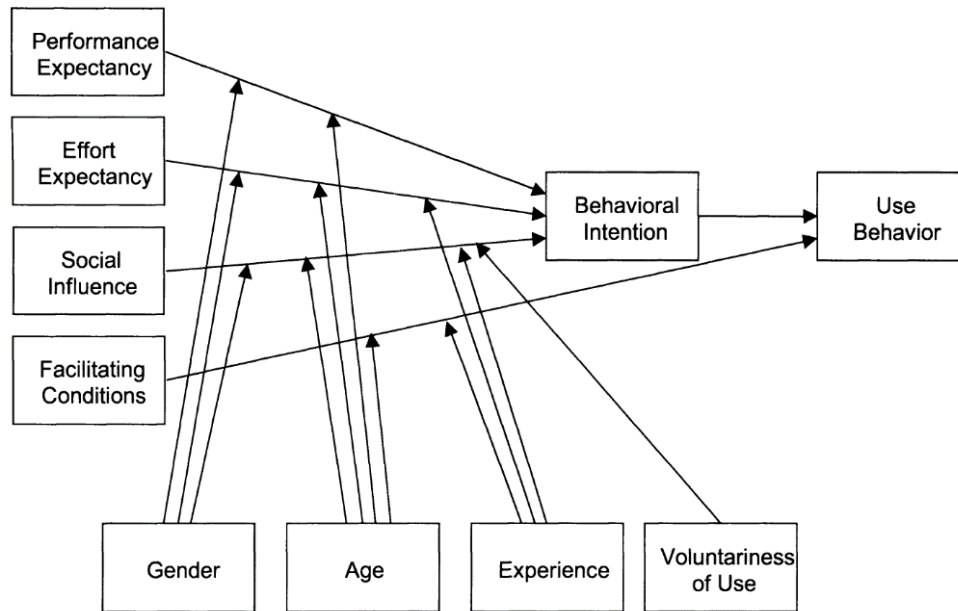
Furthermore, Deci & Ryan explain that intrinsic or integrated extrinsic motivation depends on the extent to which people have experienced the fulfillment of the three basic needs of competence, autonomy, and relatedness (Ryan & Deci, 2000) and that, in turn, depends on the environment in which you develop and the social context in which you live.

5.3.1.3. *Unified Theory of Acceptance and Use of Technology by Venkatesh et al. (2003)*

One model that has received widespread recognition in research into technology acceptance is the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. from 2003 (Venkatesh et al., 2003). The researchers used eight prominent models to explain technology acceptance and combined them into a joint framework. They used data from four organizations for six months to verify their concept.

As shown in Figure 8, four main components influence the behavioral intention and use behavior of technology in the UTAUT and can be moderated by Gender, Age, Experience, and Voluntariness of Use:

Figure 9: UTAUT Model by Venkatesh



Venkatesh et al. (2003).

1. Performance Expectancy:

The expectation relates to improving the job using the tool. Extrinsic motivation is a term that falls under this component due to the merging of existing models.

The intention is influenced by gender and age, and their hypothesis for this component is that younger men will be most affected.

Compared to Deci & Ryan's motivation concept, intrinsic motivation as an important driver to use technology could not be confirmed (Deci & Ryan, 1985). Since the study focuses on business environments, it can be assumed that the use of technology in that context is more affected by extrinsic rewards.

2. Effort Expectancy:

People who expect less effort to use technology will have a higher motivation to try it.

Conversely, there should be an intuitive understanding of the use and functionality to gain higher acceptance. Effort Expectancy is moderated by gender, age, and experience, influencing the behavioral intention of younger women with less experience.

One aspect of this component is the intuitive use, which can be perceived as requiring less effort. This influence was also mentioned by Brignull and Rogers, who studied the use of large public screens (Brignull & Rogers, 2003). The researchers found that people want to understand how to use the application on the screen quickly and do not need to spend a lot of time on interaction.

2. Social influence:

Social influence here primarily refers to the effect of others' opinions on using a technology. Older women with less experience and those who are required to use are most affected by social influence regarding their intention to use.

Deci and Ryan explain that people have a basic need for belongingness, and Maslow refers to this as a need for love and the feeling of being liked by others (Deci & Ryan, 1985; Maslow, 1943). In the context of using public screens, social influence can include more than the opinion of others about using it, as described by Maslow, Deci, and Ryan. Mainly, social media and trending topics could have an impact.

3. Facilitating Conditions:

Facilitating Conditions refer to the infrastructure and support necessary for the technology. This component has a greater effect on use than intention, because intention is influenced by the expectation of effort beforehand. That means that when the intention to use exists, the worker will utilize the technology more effectively when they receive support and a good infrastructure, which can, for example, positively impact performance and availability. This component has a greater impact on older individuals who have already gained experience.

The facilitating conditions are a component that could also affect technical use in the case of public screens.

However, it can be set under the effort expectation when it includes the study's insights from Brignull and Rogers as described above (Brignull & Rogers, 2003). Public screen applications should not be overly complex, so the need for support should be minimal. A well-performing infrastructure is a must-have for public applications because it meets people in various situations, such as while walking by or waiting for a train. They do not have much time to spend on the screen. That means it is unnecessary to test this component in the case of this research because it's a set precondition of using public screen applications.

Moreover, it must be clarified that testing will be limited to the intention of having a public screen interaction, rather than the actual use, as the methodology involves a questionnaire on fictive examples rather than a long-term experiment.

Two aspects can influence the motivation drivers and are set according to Venkatesh et al. (2003): *Gender* and *age*. Venkatesh et al. used *experience* and *voluntariness of use*. However, the planned questionnaire aims to discover more about motivators for voluntary interaction with public screens, so that point was excluded. Experience also seems unsuitable for this study because it will involve fictional examples, and the potential user may not have prior expertise. At this point, it is impossible to define if and how *gender* and *age* will have an effect so that it will be tested with the study.

5.3.2. Interaction barriers

At the beginning of Chapter 5.3, information based on a study about interaction with a public screen were presented (Brignull & Rogers, 2003). They have been formulated as barriers and have been partially confirmed by the UTAUT model of Venkatesh et al. in Subchapter 5.3.1.3 (Venkatesh et al., 2003).

Potential barriers to interacting with a public screen are:

- Environmental constraints (space around the screen, access).
- The application is not quickly comprehensible.
- Users have to spend a lot of time.
- Users gain no benefit from the interaction.

- Users cannot quickly stop the interaction and walk away.
- Other users' behaviour.

Another barrier can be the social living context, as explained in 5.3.1.2. Deci & Ryan explain that intrinsic or integrated extrinsic motivation depends on the extent to which people have experienced the fulfillment of the three basic needs of competence, autonomy, and relatedness (Ryan & Deci, 2000) and that, in turn, depends on the environment in which you develop and the social context in which you live. On the other hand, a social context can also encourage interaction, which is why this aspect is seen as an influencing factor rather than a barrier.

In the planned quantitative study, asking about a broad range of social living aspects is unsuitable; however, a question will be asked about the participant's education level. It can be deduced that the higher the level of education, the higher the income (Mou, 2023). As people's income changes, so do their living conditions and social context.

Thus, it can be hypothesized that a correlation exists between a higher social living context (education level) and motivation drivers. Suppose there is a lower fulfillment of competence, autonomy, and relatedness depending on the social living context. In that case, it can be hypothesized that there is a correlation between the social living context and the motivation to interact with the public screen to satisfy those three needs.

Germany highly values data protection (Dohmen & Schmelz, 2021). It could, therefore, represent a barrier to using interactive screens if users are required to provide data. However, it is assumed that there will be less resistance to the voluntary disclosure of data if this benefits the user (Dohmen & Schmelz, 2021). In addition, the generations that have grown up with technology in their everyday lives, known as digital natives, are less sensitive to data collection (Engels, 2018).

5.3.3. Summary

In the previous chapters, human motivators and goals were found, summarized in Table 5, and provided a reference for further processing.

The barriers are listed as a point in the motivation model in the next chapter, under general influences, and are not discussed in detail there. However, they will be analyzed later in the qualitative and quantitative survey.

Table 5: Summary of motivators

The abbreviation M in the table stands for motivator. A label was created to refer to it in the human motivation model version 1. The label numbers are, therefore, temporary for version 1 and will be adapted for Version 2 and the final study version.

Label	Sub-goal /Motivator	Based on the concept:
M1	Autonomy	(Deci & Ryan, 1985)
M2	Control	(Deci & Ryan, 1985)
M3	Competence	(Deci & Ryan, 2000; Maslow, 1943)
M4	External recognition	(Maslow, 1943)
M5	Education	(Chulef et al., 2001)
M6	Belongingness	(Deci & Ryan, 2008; Maslow, 1943)
M7	Being liked	(Deci & Ryan, 2008; Maslow, 1943)
M8	Influence	(Venkatesh et al., 2003)
M9	Health	(Chulef et al., 2001; Maslow, 1943)
M10	Hunger/thirst	(Maslow, 1943)
M11	Physical attractiveness	(Chulef et al., 2001)
M12	Warnings	(Maslow, 1943)

Author's elaboration.

The same was done with the possible barriers to interaction with public screens found in Table 6 and other influences on interactions with technology in Table 7.

Table 6: Summary of barriers

The abbreviation B in the table stands for barrier. A label was created in order to be able to refer to it in the human motivation model version 1. The label numbers are therefore temporary for version 1 and will be adapted for Version 2 and the final study version.

Label	Barrier	Based on the concept:
B1	environmental constraints (space around the screen, access)	(Brignull & Rogers, 2003)
B2	No intuitive understanding	(Brignull & Rogers, 2003; Venkatesh et al., 2003)
B3	Need to spend a lot of time	(Brignull & Rogers, 2003)
B4	users gain no benefit from the interaction	(Brignull & Rogers, 2003)
B5	users cannot quickly stop the interaction and walk away	(Brignull & Rogers, 2003)
B6	other user's behavior	(Brignull & Rogers, 2003; Venkatesh et al., 2003)
B7	Data privacy	(Dohmen & Schmelz, 2021)
B8	Bad usability	(Brignull & Rogers, 2003; Venkatesh et al., 2003)

Author's elaboration.

Table 7: Summary of influences

The abbreviation I in the table stands for influence. A label was created in order to be able to refer to it in the human motivation model version 1. The label numbers are therefore temporary for version 1 and will be adapted for Version 2 and the final study version.

Label	Influence	Based on concept:
I1	Education	(Ryan & Deci, 2000)
I2	Gender	(Venkatesh et al., 2003)
I3	Age	(Venkatesh et al., 2003)

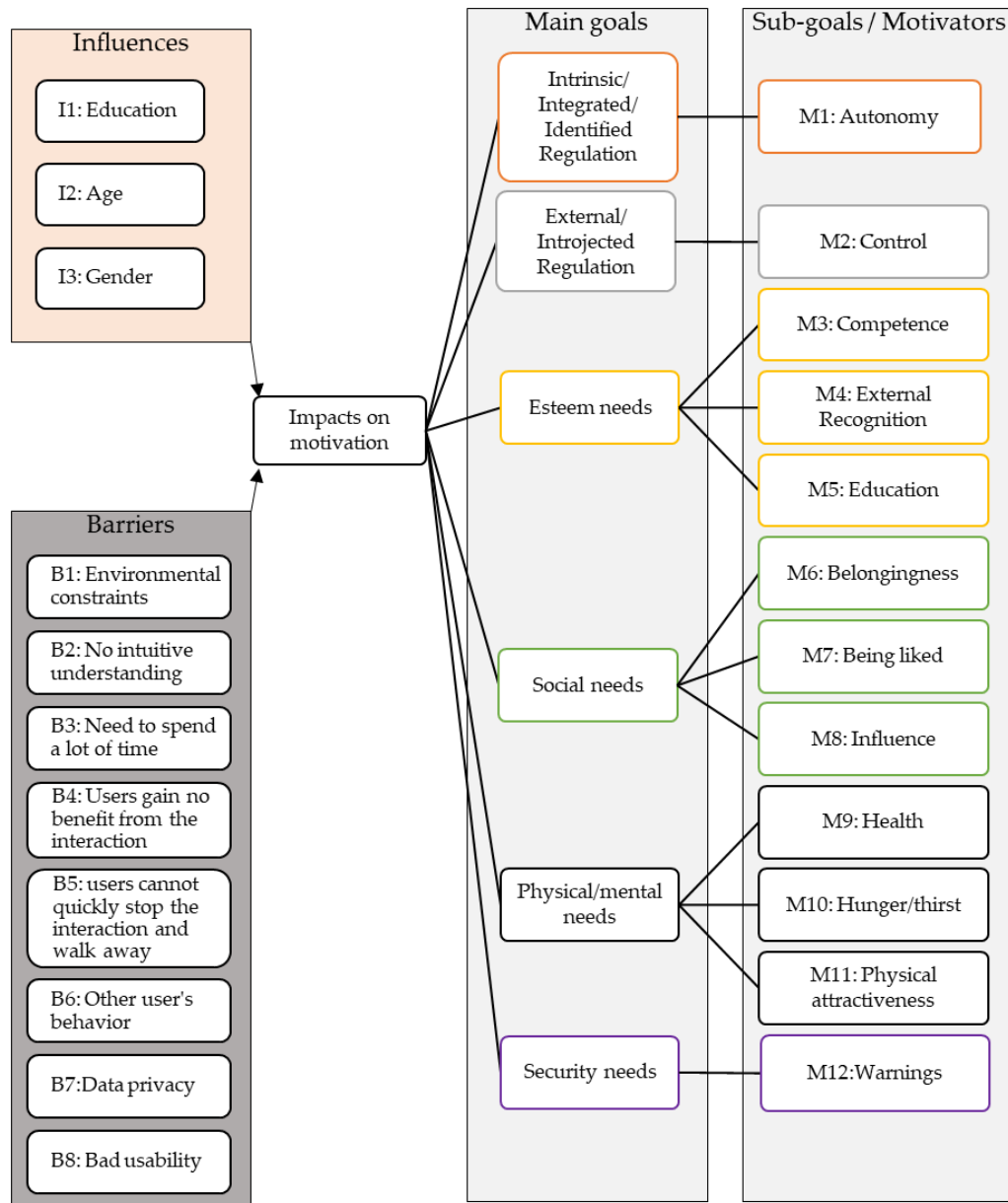
Author's elaboration.

5.3.4. Synthesis & Human Motivation Model (Version 1)

Figure 9 illustrates the initial version of a human motivation model derived from the literature review presented in the previous chapters.

The model is based on Barbopoulos' Development of a multi-dimensional and context-sensitive measure of consumption goals. Like Barbopoulos, this thesis utilized well-known frameworks that analyzed people's goals and needs, then brought them together. Barbopoulos chose Lindberg's goal framework, in which three master goals and several sub-goals were defined. In the model presented here, the terms master goals and sub-goals were adopted and supplemented by general influences on the motivation to interact with public screens. However, since aspects that can motivate people to interact with a screen have also been identified, but do not represent a goal, they have been given the name. General factors influencing motivation drivers are placed on the model's left side: social living context, age, gender, and potential barriers. The colors of the categories and drivers are set to improve visual comprehension.

Figure 10: Human motivation model (Version 1)



Author's elaboration.

Seven motivation impact factors, which serve as main goals, are listed in Figure 9, each with its explicit sub-goals on the right side.

The first is *intrinsic, integrated, and identified motivation* (see Figure 8 in Chapter 5.3.1.2), which is explained as one basic need in Deci & Ryan's concept of self-determination (Deci & Ryan, 1985). The sub-goal is autonomy as an explicit need.

The second is the group of external or introjected motivation regulations, with control as a motivator (Deci & Ryan, 1985). For the present research, Deci & Ryan's model was put together slightly differently from the same content.

The *esteem needs* were adopted from Maslow's terminology, which he sees as the need for competence and external recognition (Maslow, 1943). Deci & Ryan also use the feeling of competence as a basic need, so the two subcategories of Maslow seem to capture both approaches (Ryan & Deci, 2000). However, one driver from the cluster of Chulef et al. is to be included, namely, education (Chulef et al., 2001). Education is a topic that affects everyone and can bring benefits in terms of living standards and other areas. Initially, it was categorized under esteem needs because education can lead to appreciation and recognition.

As described in Chapter 5.3.1.3, *social needs* can be found in Maslow (1943) as the need for love and in Deci & Ryan (2008) as the wish for relatedness. However, *social needs* should be supplemented with explicit motivators, such as feeling a sense of belonging, being liked, and influencing the environment.

The research project of Chulef et al. to create a hierarchical taxonomy of human goals has created thirty sub-clusters and four main clusters (Chulef et al., 2001). Four identified central clusters from the study are family and marital relationships, physiological health and physical attractiveness, and interpersonal and individual (or intrapersonal) goals. The interpersonal goals include social motives such as recognition, getting and giving affection, and belongingness, similar to the social needs already listed in Figure 9.

The topics of family and marital relationships are not included as motives in Figure 9. Still, they will not be added since the application related to the public screen seems unsuitable. Family and marriage are private topics that will not be transferred to public screens.

The individual goals presented in Chulef et al. are not used in our study, as it aims to examine a mass medium and the motives that motivate a broader audience. Individual goals can be very different and appeal to fewer people.

Effort expectancy, introduced by Venkatesh et al. (2003), was extended with the insights of Brignull and Rogers (2003). The literature has found that high usability and intuitive understanding impact technology acceptance.

The *physical/mental needs* driver has been modified from Maslow's physiological needs. Figure 9 extends the term to physical/mental needs, including health, which can be psychological and physical, as well as hunger and thirst.

Security as an independent need was included but adapted to the use of public screens. For example, these needs could consist of the desire for warning systems for traffic or information systems, as seen during the coronavirus pandemic, which underscores the need for security.

As suggested by Chulef et al., a hierarchy exists between our identified motivation stimuli to interact with public screens and can relate to factors such as age or gender, which will be analyzed in the results of the quantitative survey.

The synthesis of the insights gained to create a model of motivation drivers and influences regarding interaction with public screens will be extended in the following section with insights from Social Science.

5.3.5. Generational research

In social science, the concept of generations has been used for decades. One of the early adopters was Karl Mannheim, who researched it in the early twentieth century (Mannheim, 1928). Many articles deal with the differences between Generations concerning the work environment (Hershatter & Epstein, 2010), (Jurkiewicz, 2000). Others analyze the shopping behavior of specific birth cohorts (Lissitsa & Kol, 2016).

Generational research assumes that people born in the same period experience similar socialization and thus share the same values and ideas. According to this theory, generation members tend to make similar decisions and actions, influenced by the experiences they have had during their lives. This supposition was applied to the subject of this research.

In this part of the dissertation, characteristics of the individual generations are first collected from the literature. Then, hypotheses on potential motivators of interaction with public screens are derived.

The Chapter will use the Generations defined by Roth-Cohen et al. (2022) and Appelbaum et al. (2004) in the following analysis.

5.3.5.1. *Baby Boomers (born 1947-1966)*

There are some differences between Baby Boomers and Generation X. One is that for Boomers, the absence of supervision has a higher value than for Gen X (Appelbaum et al., 2004). Second, the older cohort is less motivated to earn more money than to increase their quality of life (Appelbaum et al., 2004). However, the money they spend instead of saving has a high value for them (Kupperschmidt, 2000). However, there is a notable difference between first and second-wave Boomers; the first group is characterized as workaholics, a trait that increased again with the second group (Kupperschmidt, 2000).

What they appreciate and can motivate them is getting feedback in their field of work, so it will be tested if this can be applied to the interaction with public displays (Appelbaum et al., 2004).

The Baby Boomers are individualists who like to have a choice and be able to influence things (Kupperschmidt, 2000). They attribute a high value to themselves and are also called self-indulgent. They also put their own needs before those of the family if they have found one. This focus on themselves has led, among other things, to a higher divorce rate and children whose parents prefer to go to work instead of looking after them after school (Kupperschmidt, 2000).

To give a direct overview, Table 4 shows all the characteristics found in the Baby Boomer Generation.

Table 8: Baby Boomers characteristics

Characteristic	Research
Do not like supervision	Appelbaum et al., 2004
Want to increase life quality	
motivated by feedback	
Money to spend	Kupperschmidt, 2000
Money has a high value	
Individualists	
Want to influence	

Characteristic	Research
Partial workaholics	
Self-centered	

Author's elaboration.

5.3.5.2. **Generation X (born 1967-1980)**

Digital immigrants are referred to as Generation X because, for them, using new technologies was a fact of life that came into being during the further course of their lives (Prensky, 2001; Roth-Cohen et al., 2022). Chaney et al. (2017) describe this cohort from a marketing perspective as skeptical, meaning they are not easily convinced of anything (Chaney et al., 2017). It can, therefore, be assumed that they are also harder to motivate to interact with public screens. In advertising, they may be more likely to be attracted by informativity and willing to learn (Appelbaum et al., 2004; Roth-Cohen et al., 2022; Tulgan, 1996). That, in turn, could drive them to engage with screens in public.

Moreover, Gen X is defined as self-reliant and individualistic, having learned to solve their issues early on (Appelbaum et al., 2004; Tulgan, 1996; Kupperschmidt, 2000). They can handle different tasks simultaneously, so multitasking is their skill (Kupperschmidt, 2000).

They seek success and desire to have their achievements recognized publicly (Appelbaum et al., 2004; Tulgan, 1996).

Unlike the previous Generation, Gen Xers are more motivated by money and willing to spend more time on it (Appelbaum et al., 2004). In addition, they are motivated when they get feedback as an employee, so it can be assumed that they generally appreciate it (Appelbaum et al., 2004; Tulgan, 1996). This is one characteristic they have in common with the previous and the following Generations.

Table 9 lists the characteristics of Generation X described in this chapter.

Table 9: Gen X Characteristics

Characteristic	Research
Skeptical	Chaney et al., 2017
Attracted by informativity	Roth-Cohen et al., 2022; Tulgan, 1996
Willing to learn	Appelbaum et al., 2004
Motivated by money	Appelbaum et al., 2004
Self-reliant	Appelbaum et al., 2004; Kupperschmidt, 2000
Seek success and public recognition	Appelbaum et al., 2004; Tulgan, 1996
Individualists	Tulgan, 1996
appreciate feedback	Tulgan, 1996
Multitasking	Kupperschmidt, 2000

Author's elaboration.

5.3.5.3. *Generation Y (born 1981-1994)*

Generation Y (Gen Y) is also called *digital natives* (Prensky, 2001; Roth-Cohen et al., 2022). The name comes from the fact that this Generation has grown up with digital technology, and its use is a matter of routine for them.

The first characteristic to mention is one they share with the other Generations; they appreciate getting feedback (Appelbaum et al., 2004). Moreover, they are described as a cohort that “needs supervision” (Twenge et al., 2010).

Lissitsa and Kol summarize different characteristics from the literature about Generation Y (Lissitsa & Kol, 2016), their online shopping behavior research. They highlight that this Generation is socially and civically active. These findings are supported by the analysis of Wong et al. (Wong et al., 2008). They found that Millennials prefer to take responsibility and influence actions or decisions.

Table 10 presents all the characteristics of Generation Y identified through the literature analysis.

Table 10: Gen Y characteristics

Characteristic	Research
Tech savvy	Prensky, 2001
appreciate feedback	Appelbaum et al., 2004
Need supervision	Twenge et al., 2010
Social active	Lissitsa & Kol, 2016; Wong et al., 2008
Civically active	
Like to take responsibility	Wong et al., 2008
Want to influence	Wong et al., 2008

Author's elaboration.

5.3.5.4. **Generation Z (born 1995-2009)**

Because they are, compared to the other generations, the one that is most connected via mobile hardware, Generation Z got the name *mobile natives* (Roth-Cohen et al., 2022; Chaney et al., 2017). This constant use of mobile devices for communication has led them to prefer this form over direct contact (Chaney et al., 2017; Schwieger & Ladwig, 2018).

Another result of the permanent activity with internet-enabled devices is a constant flood of information. This endless information consumption by Gen Zers seems to affect them so that they cannot concentrate for a long time (Dolot, 2018; Schwieger & Ladwig, 2018). On the other hand, they are able and willing to educate themselves and acquire information rapidly (BIELIŃSKA-DUSZA, 2022; Schwieger & Ladwig, 2018).

They like variety and flexibility and constantly seek change (Dolot, 2018; Chaney et al., 2017). This need for flexibility can be a sign that this Generation likes to be individualistic and wants to adapt the environment to their current wishes. In addition, Twenge highlights the increasing individualism of Gen Z, which occurs because of the focused personal identity in social media (Twenge, 2017).

This characteristic fits in with the strong engagement with digital realities such as social networks because their content is also fast-moving, and there are always new trends. Especially to participate in this world, but for other purposes, this Generation is willing to disclose personal data about themselves (Dolot, 2018; Schwieger & Ladwig, 2018).

Pragmatism is also attributed to Gen Z, which is expressed, for example, in the fact that many of them prefer to start their careers directly instead of taking the long route of previous studies (Bielińska-Dusza, 2022; Schwieger & Ladwig, 2018).

An interesting observation is that although this cohort is self-sufficient, they need feedback and mentoring (Dolot, 2018; Bielińska-Dusza, 2022). In turn, they also like to share their opinion or experience, so they want it both ways (Dolot, 2018).

Schwieger & Ladwig (2018) have compiled various studies on Generation Z. The following tabular overview is taken from their article and has been supplemented with additional sources and findings from other studies.

In Table 11, all characteristics found for Generation Z are summarized.

Table 11: Gen Z characteristics

Characteristic	Research
Creative	Adobe, 2016; CGK Study, 2017
Entrepreneurial	Beal, 2016; Cassandra Report, 2015; CGK Study, 2017; EY, 2016 (M&E Report); Monster, 2016
Fairness	EY, 2016
Goal-Oriented	CGK Study, 2017; Stillman & Stillman, 2017
Hands-On Experiences	Adobe, 2016
High Expectations	Beal, 2016; EY, 2016 (Merriman & Valerio)
Multitasking	Beal, 2016; Merriman, 2015; Dolot, 2018
Personalized Microexperiences	Beal, 2016; CGK Study, 2017; Merriman, 2015; Monster, 2016; Stillman & Stillman, 2017
Pragmatic	Cassandra Report, 2015; EY, 2016; Bielińska-Dusza, 2022
Self-Informed	Beal, 2016; CGK Study, 2017; Merriman, 2015; Bielińska-Dusza, 2022
Self-Reliant	Beal, 2016; CGK Study, 2017; EY, 2016 (M&E Report); Monster, 2016; Stillman & Stillman, 2016; EY, 2017 (Merriman & Valerio)
Skill-focused	Cassandra Report, 2015;

Characteristic	Research
Social-Media Connections	Cassandra Report, 2015; CGK Study, 2017;
Storytelling	Adobe Report; Cassandra Report, 2015; EY, 2016 (M&E Report); Morey & Mouratis, 2016;
Trust	EY, 2016;
Workplace Advancement	EY, 2016; CGK Study, 2017
Appreciate feedback	Bielińska-Dusza, 2022; Dolot, 2018
Individualists	Chaney et al., 2017; Dolot, 2018
Personal data sharing	Dolot, 2018; Schwieger & Ladwig, 2018
Prefer mobile contact	Chaney et al., 2017; Schwieger & Ladwig, 2018
Short concentration	Dolot, 2018; Schwieger & Ladwig, 2018
Affinity for technology	Chaney et al., 2017; Dolot, 2018

Author's elaboration.

5.3.5.5. *Trend study Germany 2023*

The Youth in Germany trend study is based on representative surveys, and for the first time, in addition to 14 to 29-year-olds, the age groups of 30 to 49-year-olds and 50 to 69-year-olds were also included for comparison (Schnetzer et al., 2023). The research represents three target groups, each consisting of a mixture of two generations: 14- to 29-year-olds are members of Generation Z and Generation Y, 30- to 49-year-olds are members of Generation Y and Generation X, and 50- to 69-year-olds are older representatives of Generation X and baby boomers.

Contrary to the differences in values between "Baby Boomers" and "Generation Z" often conjured up in the media, the differences between the groups are moderate in the study. Younger and older people hardly differ in critical aspects of social interaction. The three most important values (family, health, and freedom) and virtues (honesty, reliability, helpfulness) are the same across the generations.

At the top of the list of concerns among 14 to 29-year-olds is inflation (63%), war in Europe (59%), climate change (53%), and an economic crisis (45%). Young people are also concerned about a split in society and a collapse of the pension system.

The middle-aged and older population groups take a surprisingly similar view. There are relevant differences regarding the climate, which is a more significant concern for younger people, and worries about poverty in old age, which is a more critical concern for the middle-aged.

The results of the question "Which three aspects motivate you most to perform well?" are particularly interesting for the present research. The five highest-ranked motivators are:

Generation Y and Z:

- Money (44%)
- Fun (41%)
- Achieve goals (32%)
- Recognition (27%)
- Passion (26%)

Generation Y and X:

- Money (49%)
- Fun (43%)
- Do something meaningful (33%)
- Recognition (31%)
- Doing good work (27%)

Generation X and Baby Boomers:

- Do something meaningful (43%)
- Doing good work (42%)
- Money (36%)
- Recognition (35%)
- Fun (35%)

Money as a motivator for Gen X and Gen Y has already been identified in the previous sub-chapters (5.2.2.2; 5.2.2.3) of generation research and can be confirmed. The authors suggest that the high value placed on money by younger generations may be attributed to inflation in Germany and the associated concerns about generating sufficient income.

In the study by Schnetzer et al., money slips from first to third place as a motivator in the Generation X and Baby Boomer age groups (Schnetzer et al., 2023). No literature has yet been found showing that money is particularly motivating for Baby Boomers (see 5.3.5.1). However, they like to improve their quality of life and are happy to spend money. However, the literature states that the first wave of Baby Boomers was considered workaholics, and only the second wave focused less on their careers.

The reason for this could be that the post-war Generation was initially concerned with boosting the economy and creating the basis for a better standard of living. On the other hand, the second wave of baby boomers was able to benefit more from the upturn and concentrate on enjoying life.

Doing a good job is very motivating for the oldest survey group. This result aligns with the previous subchapter, 5.3.5.1, in that Baby Boomers prefer feedback but do not want to rely on a supervisor. Gen X also appreciates input and has been characterized as self-reliant and seeking success (see 5.3.5.2).

The mixed group of Gen Y and Z did not choose “doing good work” as one of the highest motivators. They prefer to achieve goals and are motivated by passion. The goal orientation has also been mentioned in Chapter 5.3.5.4.

Recognition is rated as motivating by all survey groups, although the values decrease slightly from the older to the younger groups. Recognition was also mentioned in the literature as a motivating factor for Generation X (see 5.3.5.2).

Fun has not previously appeared in the literature analysis. It is, therefore, a new motivator considered more important by the younger generations in the survey than by the older group.

According to the survey by Schnetzer et al., doing something meaningful is also a motivator for the older two survey groups, the Baby Boomers, Gen X, and Gen Y. This is also a new aspect for further consideration in this research.

5.3.6. Summary

Table 12 summarizes all the information found in the literature regarding the different generations and their motivators from Chapter 5.3.5. It should be noted that there is no claim to completeness, but the later survey is intended to identify the motivators that would encourage respondents to interact with screens. The trends between the generations may also differ in the study. The literature mainly refers to motivators in the work environment or general characteristics, so the application to interactive screens may show different results.

If a column for a generation is not filled, no information is found for the sub-goal. However, this does not mean that this Generation could not be motivated by it. Therefore, all potential sub-goals found are included in the motivation model in the next chapter, which the quantitative survey tests. Table 12 defines a summarizing sub-goal for each character trait found to be included in the motivation model.

The label number in Table 12 continues the count of Table 5 in Chapter 5.3.3. M8 appears here again because there have been new insights from social science regarding this motivator.

Table 12: Summary of Social Science

The abbreviation M in the table stands for Motivator. A label was created in order to be able to refer to it in the human motivation model Version 2. The label numbers are therefore temporary for Version 2 and will be adapted for the final study version.

Label	Sub-goal /Motivator	Baby Boomers	Gen X	Gen Y	Gen Z
M13	Supervision	Do not like supervision	Self-reliant	Need supervision	Self-reliant
M14	Feedback	Motivated feedback	Appreciate feedback	Appreciate feedback	Appreciate feedback

Label	Sub-goal /Motivator	Baby Boomers	Gen X	Gen Y	Gen Z
M8	Influence	Want to influence	-	Want to influence	-
M15	Informa-tivity	-	Attracted by informa-tivity	-	Self-Informed
M16	Individu-alism	Individu-alists	Individu-alists	-	Individu-alists
M17	Money	Like to spend money	Motivated by earning money	Motivated by earning money	Motivated by earning money
M18	Social engagement	-	-	Civic and social active	-
M19	Fun	Like to have fun	Like to have fun	Like to have fun	Like to have fun
M20	Meaning-fulness	Want to do something meaningful	Want to do something meaningful	Want to do something meaningful	Want to do something meaningful
M21	Goal achievement	-	-	Like to achieve goals	Like to achieve goals

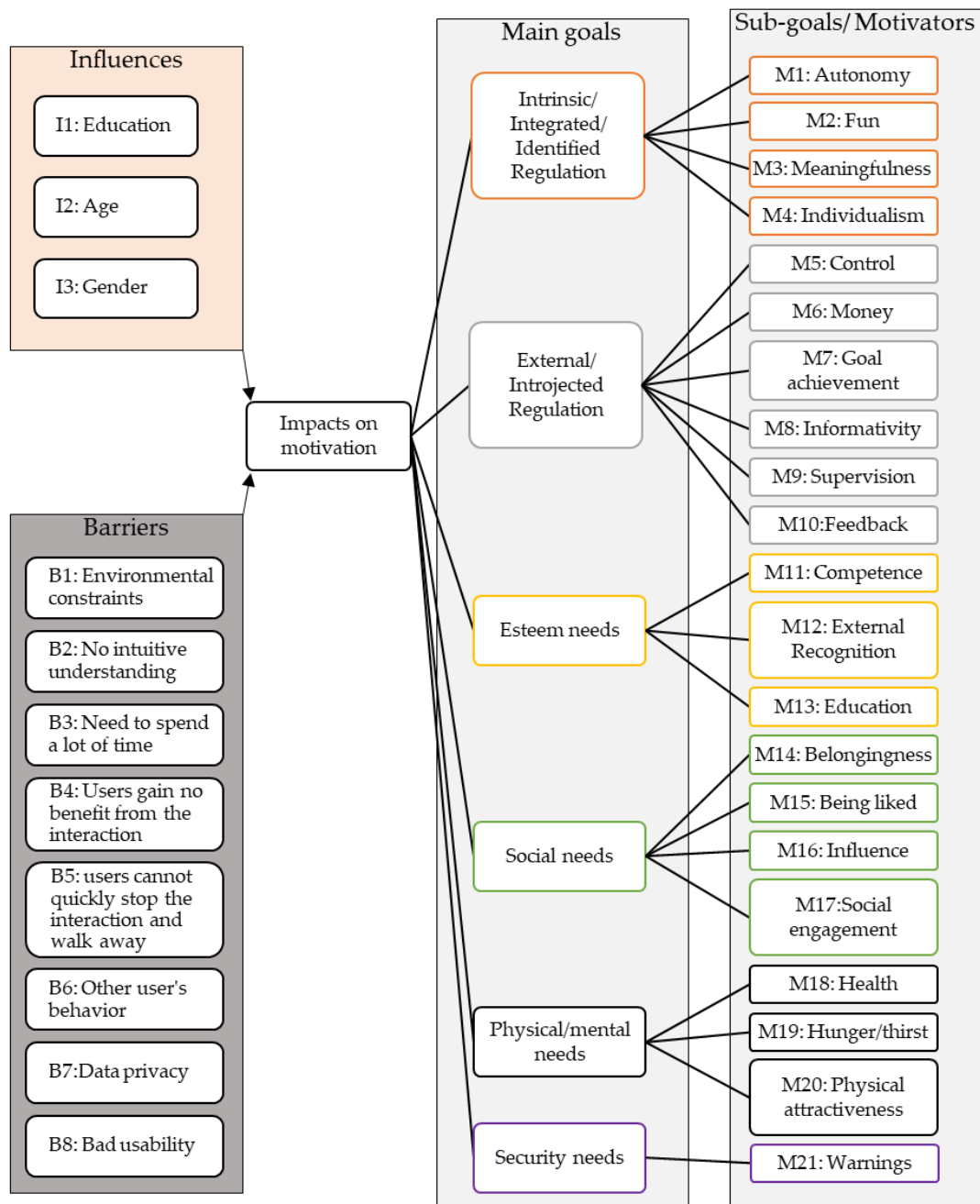
Author's elaboration.

5.3.7. Synthesis & Human Motivation Model (Version 2)

After previously analyzing literature from the social sciences, the model of motivation drivers could be expanded, as seen in Figure 12. The first main goal has been developed with the additional sub-goals of *fun*, *meaningfulness*, and *individualism*. The main goals of external regulation now include *money*, *goal achievement*, *informativity*, *supervision*, and *feedback*.

The model consists, moreover, of the sub-goal of being *socially engaged* for social needs. The other categories have no new drivers gained from social science literature.

Figure 11: Human motivation model (Version 2)



Author's elaboration.

5.4. QUALITATIVE STUDY: EXPERT INTERVIEWS

The qualitative study of this thesis aimed to gain insights from the practical application perspective of public displays. It is essential to examine not only the theoretical perspective that has been analyzed in Chapter 5.3. It is necessary to compare and connect both to achieve the goal of creating a framework that is useful for practical use cases, but also fulfils the academic guidelines.

The study contains four expert interviews, with two business people from Out-of-home advertising companies, a City Council Employee, and a Customer and User Experience Designer.

First, the design of the study was outlined. Afterward, the interviews were analyzed and presented. The last section examines if the interviews impact the defined motivation model from chapter 5.3.7 and formulates the research theses.

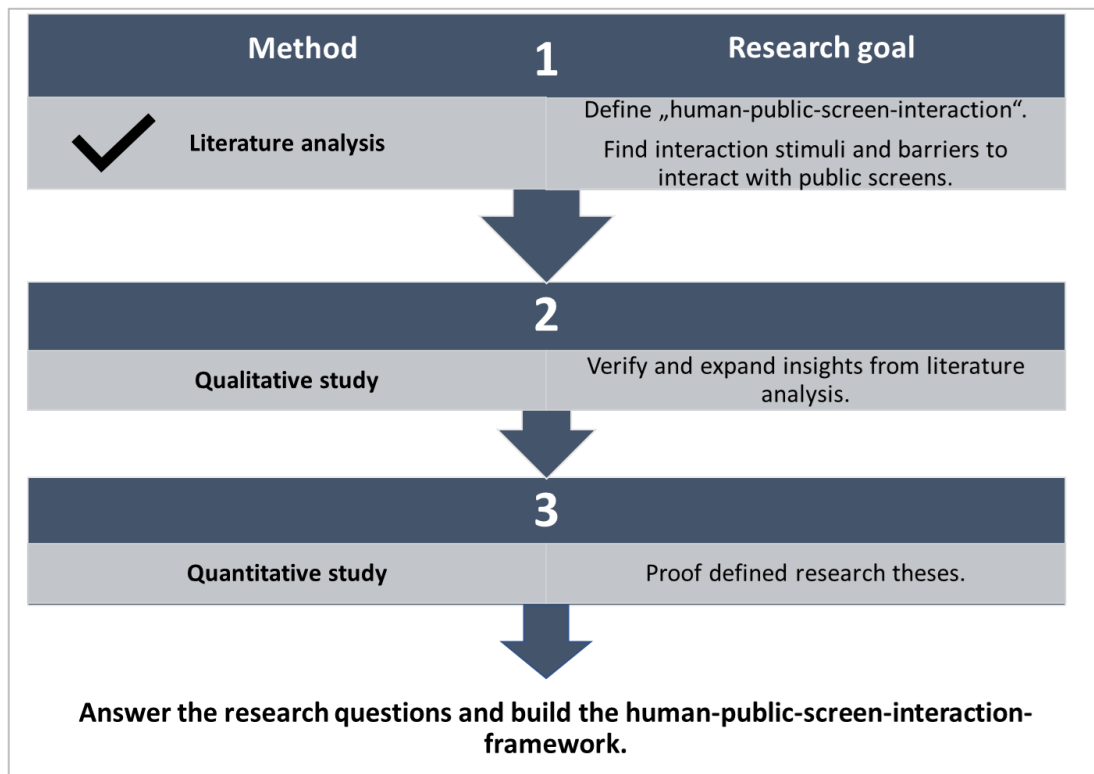
5.4.1. Design

The following three subchapters will explain the qualitative study's design in detail. It gives an overview of the method, data collection, and the experts' selection.

5.4.1.1. *Method & Data collection*

As explained, this research follows a three-step mixed-method approach. In Chapter 5.3, the literature analysis was executed. The goal of building these about what might stimulate people to interact with public screens by gaining different influences from psychology, social science, and the Unified Theory of Acceptance and Use of Technology model has been achieved. Figure 12 highlights the current status of the dissertation.

Figure 12: Mixed-method step 2



Author's elaboration.

The next step is the qualitative study, where the chosen method is implementing problem-centered expert interviews.

The problem-centered expert interview is a qualitative research method developed by Philipp Mayring (Mayring, 2016). It aims to collect and analyze expert knowledge on a specific problem or topic. There are seven main points in Mayring's approach:

1. **Problem centering:** The focus of the interview is on a specific problem or topic defined in advance. This problem should be relevant and clearly defined to enable a targeted discussion.

The interviews aim to refine the theses by exploring experts' opinions and experiences about people's motivation to interact with public screens.

2. **Selection of experts:** Experts with relevant knowledge, experience, or expertise on the selected problem are selected. These can be people who are active in practice, research, or other relevant areas.

Therefore, the decision was to interview people from a practical perspective who can tell about their experience with public screen applications. On the other hand, the goal is to obtain more information about potential motivators and impediments in motivating people for interactions. The second aspect should be examined by talking to researchers with expertise in the theoretical view. The explicit experts will be presented in Chapter 5.4.1.

3. **Interview guide:** An interview guide is prepared to cover all relevant aspects of the problem. This guide may include open-ended questions for free discussion, but it should also include specific topic areas to maintain focus.

The interview guides are listed in Chapter 5.4.2.

4. **Conducting the interview:** The interviews are performed with the selected experts. The interviewer asks questions according to the interview guide and allows the experts to present their opinions, views, and experiences in detail.

The interviews are conducted using an online meeting tool. This format has the advantage that the experts do not have to travel for a face-to-face meeting, and the probability of acceptance is increased.

5. **Recording and transcription:** The interviews are recorded, either in the form of audio recordings or notes. They are then transcribed to enable detailed analysis.

The interview will be recorded and transcribed afterward.

6. **Categorization and coding:** The transcribed interviews are analyzed by classifying relevant statements and information into codes. This process makes it possible to identify patterns, themes, and correlations in the data.

The thesis does not use this procedure. Pattern recognition becomes less meaningful since it relies on expert interviews with only a few experts, each of whom has a questionnaire tailored to their specific expertise.

7. **Interpretation and presentation of results:** The analyzed data is interpreted to conclude the problem under investigation.

In Chapter 5.4.3, the experts' answers will be analyzed to determine what insights can be gained or if new hypotheses can be made.

All interview participants received and signed a data privacy agreement that allows the use of the interviews for this dissertation. For the transcriptions, the software Microsoft Teams was used, which also recorded the interviews.

The author has manually modified the automatically produced transcriptions by using the recordings and comparing them.

5.4.1.2. *Expert Selection*

An expert with practical experience, Christian von den Brincken, the managing director of one of the leading outdoor advertising providers, Ströer Media Deutschland GmbH, was selected. His experience with screens in public spaces should provide information on obstacles and previous applications, among other things.

Another expert with practical experience is Sebastian Thelen, Co-Founder of UZE ADS Europe GmbH, a marketer of mobile advertising media such as screens on taxi roofs. To gain an objective impression of the market, it makes sense to interview a second professional from the corporate sector.

Michel Erhardt, a lecturer in information technology at the German University of Applied Sciences, was also interviewed. The City of Düsseldorf also employs him, and he previously worked for the City of Mohnheim for many years. He combines experience in the urban environment and the use of screens in this space and is familiar with human-computer interaction.

The fourth expert is Yvonne Schroerschwarz, a practicing Customer and User Experience Designer. Her Insights expand the interviews with theoretical background knowledge about the interaction between technologies and humans.

5.4.2. Interview results

The following sections include the interview results. The complete transcriptions can be found in the Appendix 1-4. In this chapter, only some relevant citations will be visible.

5.4.2.1. *Expert Interview: Yvonne Schroerschwarz*

Question 1: What motivates people to perform certain actions when using technology?

Yvonne Schroerschwarz answered this question by explaining that there are no universally valid motivators for all people. She further describes that, as an expert in customer and user experience, she is used to developing personas to identify user groups and their corresponding needs and motivators.

As an example of the different archetypes of humans, Schroerschwarz chooses dog owners with differing relationships to their dogs. They can have a more practical orientation or a more emotional connection. Transferring this to the user interaction with public displays, the motivation for the interaction can vary depending on the user group. As described in the human motivation model of Chapter 5.3.7, some motivators are pragmatic, informative, or emotional.

This finding suggests that personalized content increases user rates. However, personalization would have to take place in the extension of the application on the user's mobile device, as the application is initially made available to a broad audience.

Question 2: Are there certain examples that occur very frequently where you can say that many people are motivated, for example by financial incentives or the incentive to have fun or to be a member of a certain group??

Schroerschwarz mentions Gamification and Reward systems as proven incentives.

For example, she names badges and loyalty points that can be collected by the user when they achieve a given goal. This experience matches the meaning of extrinsic motivators of external recognition and rewards of the human motivation model.

The thesis also points to the influence of extrinsic motivators through the findings of Deci & Ryan, see chapter 5.3.1.2. Gamification and Reward systems can be seen as instruments to cause motivators, such as having fun and earning exclusive content.

Such effective short-term incentives can lead people to have repeated interactions with public screens, which could be particularly useful in the introductory phase for familiarisation with interactive screens.

Question 3: Are there also things that are perhaps not obvious?

For example, experiencing autonomy or gaining competence, are these topics also motivating when dealing with technology?

Schroerswarz confirms that intrinsic factors such as self-efficacy and gaining competence can highly motivate. Deci & Ryan's Self-Determination Theory, presented in this thesis, describes the highly coherent need for Autonomy and Competence as central to human motivation.

Compared with external motivators, fulfilling such needs could lead to sustainable intrinsic motivation to interact with a public screen. Rewards as money or loyalty points are volatile and get spent, but a new competence will last.

Question 4: To what extent, in your experience, the age of the user and also the life context, i.e. the living environment, education, etc. influence what motivates a person?

In answering this question, Schroerswarz mentions that age and education do not directly influence motivation, but there are differences between the generations in terms of interaction with technology.

Younger people, for example, who grew up surrounded by technology, might have less fear of doing something wrong because they are more familiar with such applications. It could be helpful to use popular designs and user guidance to reduce barriers.

Question 5: We're now looking more at screens in public spaces and the question of the extent to which you can imagine that such screens can fulfill certain needs or reward systems that we've talked about with the help of interactive applications.

The meaning of extrinsic rewards, personalized content, offers, bridging waiting situations, and providing information is pointed out by Schroerschwarz. Her answer underlines the theoretical approaches of Chapter 5. Public screens could play a more intensive role in the public education system. However, it is also clear that the application must always fit the environment and the context of the screen. For example, entertaining applications with a quick win should be used during waiting times, which can be interrupted when the bus arrives.

Gaining value and personalizing content should be examined in the quantitative part of this study.

Question 6: What do you think could be the obstacles that might affect the motivation to interact with such screens?

The user must directly see the value of interacting with the screen, and Schroerschwarz explains that his attention has to be caught. The meaning of interactive design was mentioned in Chapter 5 as well.

In public spaces, potential users are often busy listening to a podcast or conversing. There could be applications that support or improve an occupation that already exists in public spaces, such as waiting, shopping, or engaging in sports. Applications that offer an interaction distinct from existing public actions may face higher barriers and must provide greater value to motivate users.

Question 7: Are there motivators that work more in the long term, and conversely, are there motivators that work more in the short term?

As already highlighted in the answer to Question 3, some motivators tend to have a more short-term effect, such as earning money or getting a discount coupon, and in the long term, improving competence, such as speaking another language or collecting new information about a topic.

Summary:

The interview with Yvonne Schroerschwarz highlighted some new aspects regarding the importance of application design for public screens concerning the user group and the context. She confirms that the applications must provide an intuitive and accessible interface, which is particularly important for older generations.

Her emphasis on personalization and self-efficacy especially underlines the relevance of differentiated motivators for interaction. Schroerschwarz's statements help develop practice-oriented recommendations for increasing interaction with public screens.

5.4.2.2. Expert Interview: Christian von den Brincken

Question 1: What are the success factors for using screens in public spaces in your experience??

As a central success factor for public screens, Christian von den Brincken mentions attracting attention. Yvonne Schroerschwarz also raised this point, which underlines its importance. Von den Brincken further explains that eye-catching moving images and striking motifs can increase interest. Moreover, user interaction, such as QR scanning, can be helpful in qualifying users' attention, which means accompanying users' behavior through the application and deriving insights from it.

Question 2: Ströer has already carried out numerous interactive campaigns with customers. What are your findings?

When is it particularly well accepted? Is it generally well accepted? What are the guidelines that you have to pay attention to?

Von den Brincken emphasizes that interactive campaigns are accepted well if the users gain value directly, such as coupons or exclusive content. His statement confirms the concepts of extrinsic motivators for public screen interaction and was also mentioned by Schroerschwartz. The prospect of practical and tangible rewards seems to increase the willingness to interact.

The expert also describes a project in which an augmented reality application on a public screen allowed users to try on products virtually. This project was over ten years ago and was not well accepted. In line with the UTAUT model from Chapter 5.3.1.3, it should be questioned whether this application failed because it did not offer users any attractive added value in the public context or whether the dressing situation in front of other passers-by was perceived as unpleasant and, therefore, a barrier.

Question 3: What about the area of citizen participation via screens, i.e. calling on people to give their opinion on a certain topic or to promote an election more strongly?

To activate people for such topics and bring them to interact with a technical application seems impossible in Germany for von den Brincken. He explains that Germans, compared to other Nations, have more internal sociocultural barriers concerning new technologies. This point confirms the social living context as a potential influence, as shown in the human-motivation model in Chapter 5.3.4.

Another problem in Germany is that strict data protection requirements exist, Von den Brincken further states, complicating interactive campaigns. The data protection issue was mentioned in Chapter 5.3.2 as a potential barrier and is validated by the expert's practical experience.

Question 4: You also said that the QR code has been working better again recently. Why do you think that's working again??

As an explanation for that change of the better acceptance of public QR scanning applications, von den Brincken sees the COVID-19 pandemic. During this period, people got used to scanning QR codes for daily actions to avoid direct contact.

That means the users' acceptance depends not only on the complexity of the technology but also on how people are used to it in their everyday lives. Public screens in Germany, therefore, seem to be predisposed to new technologies that are new to people, so it is better to build applications based on standard functions.

Question 5: Okay, could you imagine, now that we are more used to paying with a double-click on the side of our cell phone, that a different technology at a different time, where “I hold my cell phone where and can do something with it”, might work better now?

Von den Brincken sees the sovereignty of platform owners such as Apple Pay as a problem when using technologies such as smartphone payment. To use the function, merchants have to pay considerable commissions, which is an economic obstacle, so the spread of these technologies to other applications is limited. There may also be a fear that platform providers will take over new merchants and push out small market players if they perceive a successful business model.

Summary:

The interview with Christian von den Brincken provided valuable perspectives on the practical application of interactive screens. Many of his observations support the theoretical foundations of this work, in particular, the influence of value generation for the user, technological and cultural hurdles, and the limits imposed by data protection in Germany.

The economic consideration of such screen applications and the problem of platform sovereignty are new aspects to be considered in the results section of the thesis, because it can not be validated by asking potential users in the following quantitative study.

5.4.2.3. *Expert Interview: Michel Sebastian Erhardt*

Question 1:

The first question I brought with me is that you've been working in the city of Düsseldorf for some time now, having previously been employed by the city of Monheim, so I've invited you as an expert on cities. I would like to ask you if you can give me an overview of how cities are currently using interactive screens?

Michel Erhardt explains that cities have only used interactive screens in individual projects. The city of Düsseldorf is currently working on introducing guidance systems for citizens in public office buildings or the central library. The focus here is on the presentation of information and navigation, which is not interactive.

Question 2:

Ok, if you look at the examples you gave, what do you think are the advantages of using interactive screens for these cases?

The first advantage mentioned by Erhardt is that there is less need for citizens to ask the employees for information because they can get it directly through the screens. Second, the screens can easily switch the language to present the information. This option raises the usability and inclusion of different nationalities. Accessibility is the third benefit Erhardt highlights. Users can get the information without depending on a particular application or hardware.

The insights from Erhardt underline the importance of high usability for public screens to raise the advantages of the applications and increase the potential user group by inclusion.

Based on the examples given by Erhardt, ideas can be developed for interactive public screens that support the relationship and work between citizens and municipal institutions.

Question 3:

Ok, what do you think are the hurdles, both technical, financial and infrastructural, in overcoming them with the introduction in a wider area, so you have now given two examples, but in your opinion, are there any major hurdles in these areas why this is not being used on a larger scale?

Erhardt explains that the presented content is one crucial aspect of accepting interactive screens. The content must be attractive and exclusive; otherwise, users can get the information directly from their mobile phones. Another aspect is the technical challenges of implementation in public spaces. There is a need for electricity and network access, protection against vandalism and weather, and construction permits from various parties. This complexity causes a high investment in installing public screens, so the advantage must be high.

The mentioned hurdles, from Erhardt's perspective, belong only to the case of a city needing to implement new screens. The new construction is necessary if the city is to use such a screen permanently with local reference. However, different public screen providers could already be booked for campaigns.

Question 4:

And with the content, as I understood you, it would have to be exclusive content that I can't just get by interacting with the screen either directly on the screen or by scanning the cell phone on my smartphone, for example, because otherwise I could simply access the page directly via my smartphone, for example from the city of Düsseldorf, correct?

Erhardt confirms the critical role of exclusive content on public screens to be attractive for users. Moreover, he underlines that a touch screen in the public sphere is not hygienic, and the users might not be willing to touch them. This aspect strengthens the approach of using the screen as an information display that allows users to get to specific content by using their mobile phones in combination.

Question 5:

Ok, then we can move on to the next question, you know a lot about data protection, do you think there are any particular hurdles in the area of data protection security in general and if so, how could you address these concerns and try to minimize the risk there?

Erhardt explains that data security issues can be avoided by forward-looking planning and using existing technological protection functionalities. Some specific network configurations and responsible data management should be made, but this should not be a hurdle from his point of view.

Question 6:

Then I come to the next-to-last question, namely what trends or developments do you see with regard to the future use of interactive screens in the urban environment?

What opportunities does this offer for cities and their inhabitants?

According to Erhardt, cities could increasingly use screens in the area of navigation, such as parking guidance systems. However, he also sees potential in applications for tourism. Screens could be a gateway to mobile worlds of experience for tourists, allowing them to explore the city.

Question 7:

Exciting ideas, thank you very much, and now I've come to the end of my questions. The last thing I'd like to ask is whether you have any further comments, things you'd like to share with me on the subject?

From Erhardt's point of view, interactive screens compete with other media like websites or mobile apps, because they are less expensive and more flexible. Another point he mentions is that different media should merge to be more attractive and usable.

Summary:

The answer to question 7 is especially relevant to the thesis because it highlights the challenges and role of interactive screens in the public digital ecosystem. There must be a real benefit for the user, and the content must be exclusive to differentiate it from other media. This insight underlines the relevance of the thesis approach, which focuses on the users and their motivations.

Erhardt's comment regarding the melting of different media complements the thesis's consideration of using mobile devices in combination with public screens and extending the dimension of media convergence. Digital screens should not be studied in isolation but as part of a comprehensive experience.

5.4.2.4. Expert Interview: Sebastian Thelen**Question 1:**

Super okay, then I'll start directly with the first question, which is what are the success factors for the use of mobile screens in public spaces?

Sebastian Thelen mentions two central success factors:

1. Design of the frames: The screen design has to be innovative and unique to get attention. For example, a screen can be implemented on a bicycle that drives the screen through the city. Another example is to have plants around the screen.
2. Content: The content should be dynamic as it generates more attention than static versions.

According to Thelen, the success of mobile screens depends on visual stimuli and content strategies that are both crucial for user acceptance. In this research, no practical testing would be an appropriate method to test these theses.

Question 2:

But it could also be something that the city would like to broadcast, for example, on the topic of politics, civic participation, i.e. some topic that requires the user to interact with a screen.

In your experience, how can people be motivated to do this?

Thelen underlines the relevance of the user's needs in his answer, which could be knowledge generation or information transfer. Only people with a clear benefit will spend time and attention on the screen.

Thelen's statement supports this research's hypotheses that focus on the user's needs as motivators to interact with a screen.

Question 3:

You are an expert in the field of out-of-home advertising and campaigns. Have you had any experience of using QR codes to generate interaction?

If so, what are your findings?

There are two experiences that Thelen reports:

1. Traffic: A campaign that provided QR-Codes on mobile displays failed because the users might not have time to scan the code while being part of the traffic.
2. Fair: A successful example was implemented at a fair, where the user scanned a QR Code and received a profit directly.

These two examples highlight the cruciality of the environment and social situation in which a display application should motivate people to interact.

Question 4:

The next question is aimed at what other use cases you can imagine for the use of screens and interactive applications in public spaces in the future.?

If so, what are your findings?

According to Thelen, providing relevant real-time information, such as warnings or missing persons, can increase the acceptance of interactive public screens.

Regional and time-critical content can already be seen on existing public screens in cities and has increased in recent years.

Question 5:

The question would have been what opportunities the use of screens offers for cities and their inhabitants, and from what you have just said, I would conclude that the exchange of information in particular can be strongly promoted regionally and locally.

Do you agree with me, and can you perhaps think of anything else?

Thelen confirms what he has answered before: regional and local information, such as the weather or events, can support public information sharing.

Question 6:

Okay, on the other hand, are there any barriers that you know of, or that you could imagine, when thinking about the expansion of such interactive screens in public spaces?

For Thelen, a barrier is that campaigns are regulated, for example, to prevent interference from traffic and not affect the participants' attention. Moreover, he explains that there is a need for standardized rules for technologies such as Augmented Reality or other applications that should provoke interactivity. If the screen prompts people to stop and perform an action in front of it, this should not be a location where a human bottleneck can form.

Question 7:

Okay, yes, thank you very much, very exciting ideas and content.

I would just like to ask if you have any further comments on our conversation?

Thelen wishes for more interactive campaigns in the out-of-home area and sees this as a good opportunity for further innovative development.

Summary:

The interview with Sebastian Thelen delivers valuable practical insights that concretize and expand the theoretical foundation of this thesis. Especially highlighting the design and content of public screens as success factors, and the role of providing tangible benefits as key elements, strengthens this research work.

Moreover, he points out that interactive screens have high potential to enhance the functionality and experience of public spaces when approached creatively and strategically.

5.5. QUANTITATIVE STUDY: SURVEY-BASED VALIDATION

The quantitative study represents the final step of the mixed-methods approach, built upon the results of the literature review and the practical insights gained through expert interviews.

The literature provided several motivators and barriers to be tested in the context of public-screen interaction. The results of the previous analysis have been confirmed through the expert interviews. The experts highlighted additional factors influencing public-screen interaction, such as situational elements and design requirements, which are valuable for the Human-Public-Screen Interaction Framework.

In the following sections, the final motivators, barriers, and moderating factors model will be developed and presented for practical application in a question-based survey. Next, the research hypotheses, survey design, and validation process will be outlined. Finally, the study results will be presented as the empirical basis for the HPSI Framework.

5.5.1. Human Motivation Model (Study version)

For the explanations given below, the following streamlining regarding the motivators and barriers for the questionnaire was carried out, and the study version of the human-motivation model was created accordingly. Moreover, this final version integrates practical considerations for survey implementation. It ensures that the elements are testable in a structured questionnaire format.

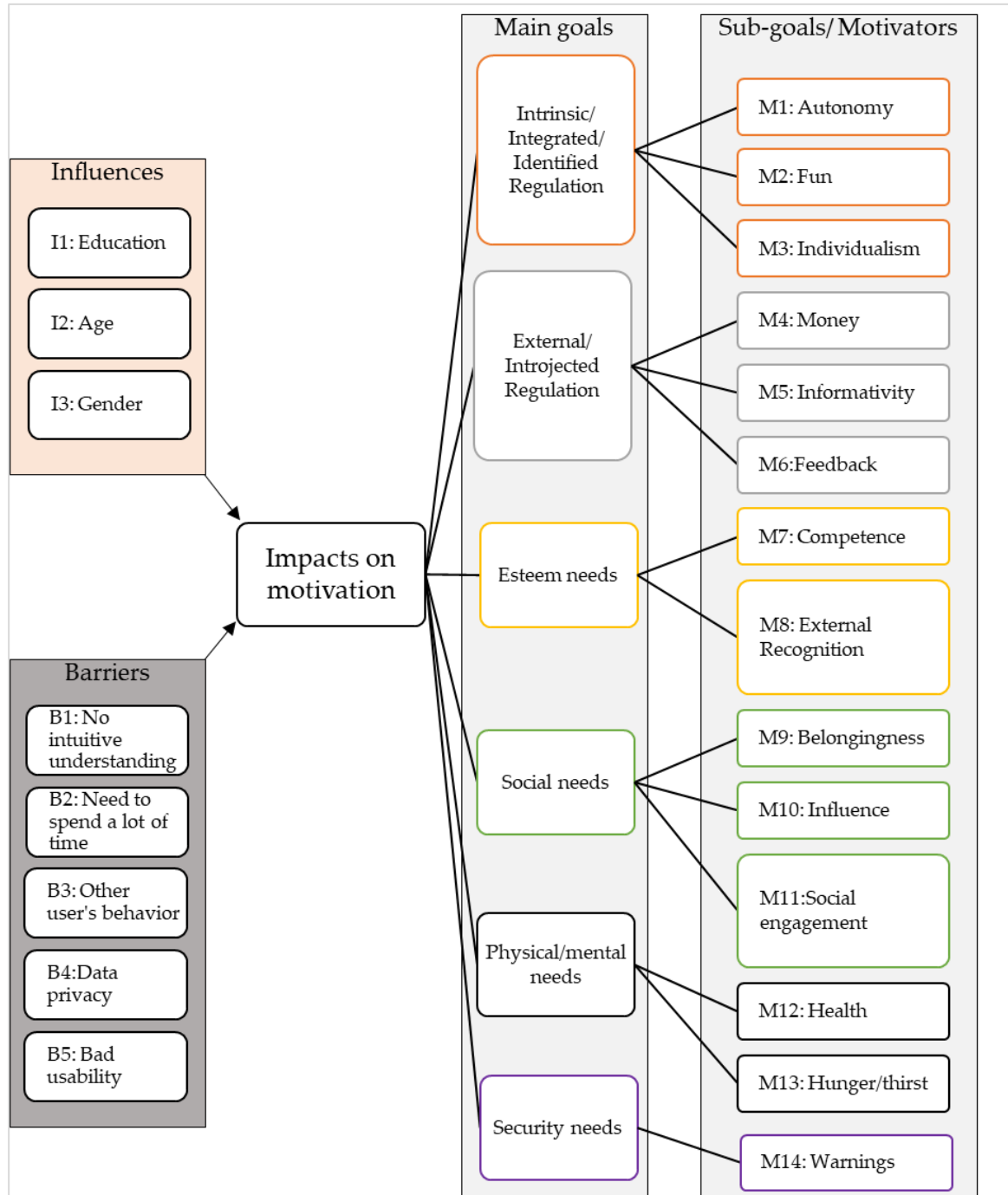
In this chapter, the adjustments made to improve the applicability of the research design are listed and explained. Afterward, the human-motivation model is illustrated in its study version.

- **M3 - Meaningfulness:** Doing something meaningful can mean different things to different people. Finding an application that clearly represents something "meaningful" for all respondents is challenging.
- **M5 - Control:** If there were an obligation to interact with a screen in public, the question of willingness would become irrelevant.
- **M7 - Goal achievement:** Goal achievement is also highly individual. People have different goals, so a universal application is not feasible in this study.
- **M9/B2 — Supervision/application that is not quickly understandable:** The literature review indicated that it would be a barrier if users did not understand the application quickly, making supervision unnecessary. Therefore, the two will be tested together.
- **M13 — Education:** Users can experience competence through education, so these items will be tested with educational methods.
- **M15 – Being liked:** It's difficult to find an application for public screens that directly influences being liked by others..
- **M20 – Physical attractiveness:** Increasing the perception of one's physical attractiveness with a public screen does not appear to be a suitable use case.
- **B1 - Environmental constraints:** Environmental constraints are excluded in the study by allowing the interaction to be operated with the smartphone. For example, there is no restriction as there would be if you had to stand directly in front of the screen to manage it.
- **B4 - Users gain no benefit from the interaction:** The study assumes that users can be motivated by various benefits. If this is not the case, the corresponding H0 has to be confirmed. So, this barrier will be excluded.
- **B5 - Users cannot quickly stop the interaction and walk away:** This barrier can also be eliminated by using a smartphone.

NOTICE: The following study version of the human-motivation model in Figure 13 got a **new counting** (M1-M14; B1-B5) for the motivators and barriers because some previous versions were excluded for further testing, as explained in this chapter.

The current model includes five barriers, three moderating influences, and fourteen motivators; see Figure 13. These elements serve as the foundation for the subsequent item development process.

Figure 13: Human motivation model (Study version)



Author's elaboration.

With the study version of the model, an operationalizable structure for the investigation of psychological and demographical factors of human-public-screen interaction is provided. With this empirical backbone, hypotheses and quantitative validation can be formulated.

5.5.2. Research Hypotheses

Based on the refined human motivation model for public screen interaction, this chapter formulates hypotheses to be tested in the quantitative analysis. The hypotheses aim to empirically test whether the found motivators and barriers influence users' willingness to interact with public screens. In addition, the moderating factors of age, education, and gender should be explored.

- **H1:** The fourteen discovered motivators significantly engage people to interact with public screens.
- **H2:** People perceive the eight discovered barriers as significantly interfering with public screen interaction.
- **H3:** The respondents' education, age, and gender significantly influence how strong the approval for each motivator, barrier, and general willingness for public-screen interaction is.

With the created hypotheses, the theoretical assumption about human-public-screen interaction can be statistically tested. They provide a structured framing to explore the relevance and explanatory power of the postulated motivators, barriers, and demographic moderators in human-public-screen interaction.

5.5.3. Design

The methodical design of the study, which forms the third and final part of the mixed-method approach applied in this dissertation, is presented in the following.

The study design aims to create a robust questionnaire based on the Human Motivation Model (Study version), including validated constructs and comprehensible application scenarios. The operationalization of key variables, creation of research hypotheses, and sample frame definition are part of this design process. This systematic approach ensures meaningful study results to validate and refine the HPSI framework.

The online questionnaire was implemented using SoSci Survey and made available to participants at www.soscisurvey.de (Leiner & Leiner, 2024).

5.5.3.1. *Constructs and items*

The study will test the following four constructs:

- 1. General User Willingness to Interact with Public Screens.**

The construct of general *User Willingness* to obtain information about users' readiness to interact with public screens reflects the acceptance of technology.

- 2. Motivation to interact with public screens.**

The fourteen motivators from the human motivation model (Study version, Chapter 5.5.1) will be used to test motivation.

- 3. Barriers to interacting with public screens.**

The five barriers from the human motivation model (Study version, Chapter 5.5.1) will be tested against this barrier.

- 4. Influences on motivation to interact with public screens.**

The influences will be tested by three influence factors from the human motivation model (Study version Chapter 5.5.1).

Table 13 presents the sociodemographic questions that illustrate the influences of the study model.

Table 13: Sociodemographic questions

Label	Influence	Item	Answer Options
I1	Education	What is the highest educational qualification you have?	• I have no degree • Primary school • Lower secondary school certificate • Intermediate secondary school certificate • High school graduation • Vocational training • Master craftsman/Technician • University degree • Doctorate (PhD) • Other
I2a	Age (Filter question)	Were you born after 1947 and are at least 16 years old?	• Yes (Questionnaire goes on) • No (Exit text follows)
I2b	Age	How old are you?	• Number (whole number, no decimal places)
I3	Gender	Which gender do you belong to?	• Female • Male • Diverse

Author's elaboration.

The corresponding items are listed in Table 14. The labels in Table 14 refer to the study version of the human motivation model and the item labels in the questionnaire. If there are several items for one Motivator/Barrier, one letter has been added to the label.

Table 14: Questionnaire construct User Willingness

Label	Construct	Item
UW1	User Willingness	I find it interesting to interact with public screens.
UW2		I can imagine myself using an application on a public screen.

Author's elaboration.

For the motivators and barriers, it was necessary to identify application examples (e.g., playing games leads to fun). When developing the items, care was taken to ensure that they were either intuitively comprehensible or theoretically grounded.

Therefore, the last column of Table 15 lists references from the literature for more complex or abstract motivators. This differentiated approach allows theoretical alignment and a pragmatic, participant-friendly questionnaire design.

Table 15: Questionnaire motivators

Question:		How much would the following options motivate you to interact with a public screen?	
Label	Motivator	Item	Reference ¹
M1a	Autonomy	Involvement in the design of my residential area.	(Deci & Ryan, 2008; Hüning et al., 2018).
M1b		The possibility to co-determine the screen content.	
M2a	Fun	A touchscreen that shows a funny video, tells a joke or plays a funny sound effect with a hand wave.	Intuitive comprehensible.
M2b		Access to an augmented reality racing game: your smartphone controls a digital car that “drives” through the public.	(Koivisto & Hamari, 2019; Saleem et al., 2022).

Question:		How much would the following options motivate you to interact with a public screen?	
Label	Motivator	Item	Reference¹
M3a	Individualism	Personalized information such as event tips or route maps.	(Blom & Monk, 2003; Franke & Schreier, 2008).
M3b		Personalized deals from nearby stores.	
M4a	Money	A voucher for a store near me.	Intuitive comprehensible.
M4b		A direct profit in euros.	
M5a	Informativity	Exclusive insider tips for exploring my current location.	(Cahyadi et al., 2012)
M5b		Historical insights: augmented reality tours through the city's history.	(Basheer et al., 2023; Cahyadi et al., 2012)
M6a	Feedback	Style advice: Fashion recommendations based on my outfit (directly on my cell phone).	Intuitive comprehensible.
M6b		Feedback on knowledge tests or personality tests with further information on my cell phone.	
M7a	Competence	Free access to a learning app of your interest (e.g. language, cooking)	Intuitive comprehensible.
M7b		Interactive learning challenges on the screen that adapt to my skill level and provide instant feedback.	

Question:		How much would the following options motivate you to interact with a public screen?	
Label	Motivator	Item	Reference¹
M8a	External recognition	Ability to stream my own content from the smartphone to the screen.	(Huang & Narayanan, 2021)
M8b		Opportunity to submit special personal achievements. A vote will decide which success stories will be shown on the screen.	
M9a	Belongingness	“Our neighborhood” → Passers-by can upload photos, which then tell the story of the place as a collage on the screen.	(Khoo et al., 2023)
M9b		Collective art projects → Anyone can help shape a digital work of art - by adding a small brushstroke or symbol.	(Burnett & Spelman, 2011)
M10a	Influence	User can submit ideas, which are then evaluated by others and possibly implemented.	(Ahmadi et al., 2022; Garaus et al., 2024)
M10b		Users can vote for smaller urban improvements such as additional seating, temporary flower beds or street art, which are then implemented in the short term.	
M11a	Social engagement	Participate in a fundraising campaign for a good cause.	Intuitive comprehensible.

Question:		How much would the following options motivate you to interact with a public screen?	
Label	Motivator	Item	Reference¹
M11b		A live feed shows items that are offered free of charge or for exchange in the vicinity (e.g. books, tools, furniture), which you can register directly to collect.	
M12a	Health	Spontaneous movement challenges → mini-workouts (e.g. 10 squats) that are recognized and rewarded (e.g. with points or coupons).	(Garber et al., 2011)
M12b		By asking simple questions or scans (e.g. facial analysis for skin health), the screen sends health recommendations to my cell phone.	Intuitive comprehensible.
M13a	Hunger/Thirst	An interactive game on the screen rewards users with snacks or drinks.	Intuitive comprehensible.
M13b		Users can select a restaurant menu directly from the screen, pay and receive their food at a nearby pick-up point.	
M14a	Security	The screen shows in real time whether there are any dangerous incidents, closed roads or emergency warnings in the area, which I as a user can confirm or correct.	Intuitive comprehensible.

Question:		How much would the following options motivate you to interact with a public screen?	
Label	Motivator	Item	Reference¹
M14b		Using the screen, I can activate a temporary security zone in which the area is illuminated more brightly, a security camera is focused, a flashing alarm light is activated or a help signal is sent to the local authorities.	

¹The reference(s) underline, if necessary, that the items are suitable to test the corresponding motivator.

Author's elaboration.

Table 16 shows the created items for the five Barriers and the corresponding references.

Table 16: Questionnaire barriers

Question:		How much do you agree to the following statements?	
Label	Barrier	Item	Reference¹
B1a	No intuitive understanding.	I would avoid interacting with a public screen if I don't immediately understand how to use it.	(Venkatesh et al., 2003; Venkatesh & Davis, 2000).
B1b		If I need instructions to understand how the screen works, I am less likely to use it.	
B2a	Need to spend a lot of time.	I would not use a public screen if it takes too long to complete an action.	(Karahanna et al., 1999).

Question:		How much do you agree to the following statements?	
Label	Barrier	Item	Reference¹
B2b		If interacting with the screen requires a lot of steps, I would rather not use it.	
B3a	Other user's behavior.	I would avoid using a public screen if others are watching me while I interact with it.	(Venkatesh et al., 2003).
B3b		If other people are blocking the screen or using it inappropriately, I would not want to interact with it.	
B4a	Data privacy.	I would be reluctant to use a public screen if I have to enter personal information.	(Malhotra et al., 2004; Stewart & Segars, 2002).
B4b		If I don't know how my data is used, I would not interact with the screen.	
B5a	Bad usability.	If the screen does not respond well to my input, I would not use it.	(Venkatesh et al., 2003; Venkatesh & Davis, 2000)
B5b		I would avoid using a public screen if the interface is confusing or poorly designed.	

¹The reference(s) underline, if necessary, that the items are suitable for testing the corresponding barrier.

Author's elaboration.

The scale used for User Willingness, motivators, and barriers is a five-point Likert scale on ad-hoc questions (Döring & Bortz, 2016), see Figure 14. The evaluation ranges from “no approval at all” to “extremely approving”:

Figure 14: Scale example



Created by Author with Jasp (JASP Team, 2025).

5.5.3.2. Sample and data collection

The study surveys people from Germany born between 1947 and 2009. As before, the generations are divided into Baby Boomers (1947-1966), Gen X (1967-1980), and Gen Y (1981-1994). Gen Z is considered from the birth year 1995 up to and including 2009. The reason for excluding the younger Gen Alpha is that in Germany, minors under the age of 14 must be interviewed under special conditions, which is not possible within the scope of this study.

The survey was distributed via direct contact using mobile phone chats, forwarded by these individuals, and shared on social media.

The sample size must include at least 157 persons, as calculated using GPOWER, a power analysis program (Erdfelder et al., 1996). The standard settings were used for the calculation: a maximum error probability of 5% and a minimum probability of 80% of detecting an effect if it exists.

5.5.4. Pretest, validity, and reliability

To ensure the validity and reliability of the questionnaire, a three-stage pretest was implemented in addition to the expert interviews.

The pretest was carried out in three stages. This chapter describes the validation process to ensure the clarity, reliability, and internal consistency of the derived items.

First, one participant was given the survey to complete and the opportunity to leave comments. The results were then incorporated directly into the questionnaire. This approach has the advantage of detecting significant errors at an early stage.

In the second stage, 12 people took part, at least two of whom belonged to each of the three relevant cohorts. This group filled out the questionnaire and could leave comments as well. This test stage also detected problems of comprehensibility, logic, structure, and initial patterns. The adaptation of the questions took place in direct agreement with the commentators, so they should probably solve the initial problems and have not been tested again in the pretest stage three.

Moreover, Cronbach's Alpha was used to identify items in the second pretest that did not measure the construct/motivator/barrier it should (Taber, 2018).

Afterward, the third pretest stage tested only the changes made due to an acceptable Cronbach's Alpha value. For that last test, 10 of the group from test stage two participated. The decision to test only the items with insufficient internal consistency again was made for two reasons: First, improving the psychometric quality of the scale was prioritized, as low reliability can significantly compromise the interpretability of the study results. Secondly, to avoid overburdening participants, the retest was limited.

In addition, the content changes were discussed personally with the commentators so that the acceptance of at least this person was ensured.

5.5.4.1. *Validation of the items (Pretest 1 and 2)*

After eliminating gross errors regarding logic and correctness in the first test stage with one test person, the pretest results of stage two with 12 people led to the following items being reformulated to ensure comprehensibility and construct validity (see Table 17).

Table 17: Changes from Pre-Test

Label	Change	Realization
I2b	Limitation of the input option	- Defined characters: Number (whole number, no decimal places) - Smallest permitted number: 16 - Largest permitted number:: 77
M7a	Reformulation for clarity	Free access to a learning app on the smartphone (e.g. language, cooking).
B3b	Reformulation for clarity	If many people are standing in front of the screen or operating it incorrectly, I wouldn't want to interact with the screen.
M2b	Reformulation for clarity	A digital car racing game that you can play on your mobile phone with others. While you tilt or swipe your mobile phone, you steer the car through the city. You get the game by scanning a QR code from the public screen.
M3b	Reformulation for clarity	Personalized offers from nearby stores.
M8b	Reformulation for clarity	The opportunity to submit special personal success stories, such as "I ran a marathon". A vote decides which success stories are shown on the screen.
M10a	Reformulation for clarity	To be able to vote on minor urban improvements such as additional seating, new flower beds, or street art, which are then implemented in the short term.
M10b	Reformulation for clarity	To be able to submit new ideas for projects in the region, which are then evaluated and possibly implemented by those responsible.
M12a	Reformulation for clarity and	Spontaneous movement challenges → mini-workouts (e.g., how fast can you do 10 squats?)

Label	Change	Realization
	exclusion of reward to focus on health as a motivator	that are automatically recognized, and the screen then explains why this exercise is healthy.
M14b	Reformulation for clarity	Using the screen, I can activate a temporary security zone around the screen, in which the area is illuminated more brightly, a security camera is focused, a flashing alarm light is activated, or a help signal is sent to the local authorities.
I1	Addition of answer options	- I have no degree - Elementary school - Secondary school certificate (in Germany, two different degrees are possible) - High school graduation - Vocational training - Master artisan training - University degree - PhD - Others

Author's elaboration.

Cronbach's Alpha was determined using the statistic software JASP (JASP Team, 2025). The Bayesian Unidimensional Reliability was calculated for the pretest data because the sample is small, and the classical calculation can give unrealistic results (Pfadt et al., 2022).

The accepted values must be equal to or higher than 0.5 and lower than 1 to be accepted for further work (Taber, 2018). Table 18 shows the results for Pretest 1.

Table 18: Pretest 1 Cronbach's Alpha

Label	Cronbach's Alpha	Acceptability
M1	.61	Ok.
M2	-.34	The value is too low.
M3	.47	Ok.
M4	-.28	The value is too low.
M5	.76	Ok.
M6	.46	Ok.
M7	.74	Ok.
M8	.61	Ok.
M9	.89	Ok.
M10	.75	Ok.
M11	.55	Ok.
M12	.76	Ok.
M13	.79	Ok.
M14	.53	Ok.
B1	.75	Ok.
B2	.95	Value to be discussed.
B3	.66	Ok.
B4	.40	The value is too low.
B5	.50	Ok.
UW	.20	The value is too low.

Author's elaboration.

The Cronbach's Alpha of Motivator Fun M2 is -0.3 and can not be accepted. One aspect might be that M2b, the car race game, was not comprehensible for all participants, as described by one person in the second test stage of the pre-test. M2b was already reformulated for the next test stage; see Table 17.

To increase reliability and get more consistency, M2a was changed to an example that is closer to the gaming approach of M2b:

- **M2a:** A mini-game in which you can see a funny video, hear a joke or play a funny sound effect by moving your hand.
- **M2b:** A digital car racing game that you can play on your mobile phone with others. While you tilt or swipe your mobile phone, you steer the car through the city. You get the game by scanning a QR code from the public screen.

The Motivator 4 should measure if a financial incentive animates people to interact with a screen. The Cronbach's Alpha was - 0.3, showing that the two items are inconsistent. The direct profit in euros is independent of a purchase compared to a voucher, which might cause the difference. The two items of M4, therefore, were changed as follows:

- **M4a:** A voucher for a free product from a local shop.
- **M4b:** A five-euro shopping voucher for a local shop.

Barrier B2 had a Cronbach's Alpha of (rounded) 1 because only two participants rated the items that measured the need to spend a lot of time differently. It might be that the items were formulated too similarly. Therefore, B2a was reformulated, so the two items are:

- **B2a:** I wouldn't use a public screen if I couldn't control or cancel the interaction myself.
- **B2b:** If interacting with the screen requires a lot of steps, I would rather not use it.

For Barrier B4, Cronbach's Alpha was 0.3, so the two items might not measure data security in the same way for the participants. One item focuses on data entry, and the other on the use of the data. Therefore, the focus was placed on the entry of the data, and B4b was reformulated for this purpose:

- **B4a:** I would be reluctant to use a public screen if I had to enter personal information.
- **B4b:** Entering personal data, such as my name or email address, is a reason for not using an application on a public screen.

The items UW1 and UW2 were also used in the first pretest to test general user readiness. The reliability analysis yielded a Cronbach's alpha of 0.2, indicating low internal consistency. However, the critical evaluation of this value only took place after the second pretest was completed, so the scale was not tested again in its revised form. A third pretest was not feasible due to time constraints. The two items were adapted as follows concerning their clarity of content:

- **UW1:** I can imagine actively using a public screen if offered an interesting application.
- **UW2:** In principle, I would be prepared to try out interactive services on a public screen.

5.5.4.2. *Reliability analysis (Pretest 3- Retest)*

After testing the two adapted motivators and barriers in a third Pre-Test, Cronbach's Alpha value has been analyzed again; see Table 19.

Table 19: Pretest 3 Cronbach's Alpha

Label	Cronbach's Alpha	Acceptability
M2	.88	Ok.
M4	.93	Ok.
B2	-.20	The value is too low.
B4	.63	Ok.

Author's elaboration.

Except for B2, all items could be adjusted to achieve an acceptable Cronbach's alpha in this test. B2a focused on the ability to cancel the interaction, which might test the control construct and not time expenditure. Therefore, B2 has been reformulated as follows:

- **B2a:** I wouldn't use a public screen if the interaction takes more than a few seconds.
- **B2b:** If interacting with the screen requires a lot of steps, I would rather not use it.

Due to limited test resources, B2 must be transferred to the final survey in an adapted form and checked again for reliability.

5.5.5. Study Results

After the finalization of the questionnaire, it was distributed to a German sample to investigate which motivators and barriers affect the intention to interact with public screens. This chapter presents the results of the quantitative analysis and builds the empirical foundation for the Human-Public-Screen Interaction (HPSI) model.

The descriptive part gives an overview of the sample attributes and summarizes the responses across the group. Afterward, the inferential statistical part examines relationships between motivators, barriers, moderating factors, and the willingness to interact with users.

5.5.5.1. *Descriptive Analysis*

This section provides a descriptive overview of the collected data. It includes demographic information about the participants and descriptive statistics that aggregate the responses. These insights help contextualize the following inferential findings and serve as the first indicator for user preferences.

The questionnaire's setting did not allow skipping a question, so the sample of N=200 answered all questions. The following describes the sample distribution regarding gender, age, and education.

Gender

The sample has the gender distribution:

- Male: 81
- Female: 119
- Diverse: 0

Age

The oldest participants are 78 years old, and the youngest is 16. The questionnaire excluded people born before 1946 or younger than 16. The average age of the sample is 45 years, with a standard deviation of 15.8. The sample includes a relatively balanced distribution across the age groups, which helps determine the effect of age on the motivators. The participants can be divided into four generations as follows:

- Baby Boomers (59-78 years): 44
- Generation X (45-58 years): 51
- Generation Y (44-31 years): 72
- Generation Z (16-30 years): 33

Education

The distribution of education in N can be categorized into three levels (see Table 20). The majority of participants have a high level of education. Those with no degree are separated to the group “other.”

Table 19: Education distribution

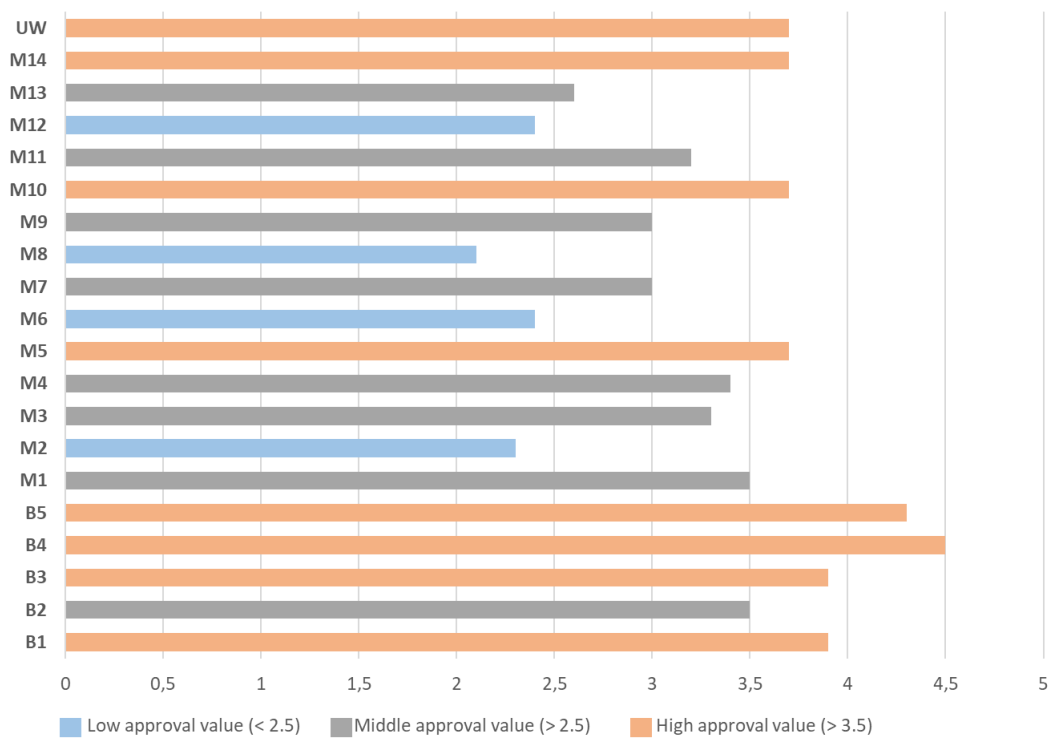
Category	Education	Sum
Low	• I have no degree: 0 • Primary school: 0 • Lower secondary school certificate: 2	2
Intermediate	• Intermediate secondary school: 17 • Vocational training: 31 • Master craftsman/Technician: 10	58
High	• High school graduation: 33 • University degree: 99 • Doctorate (PhD): 4	136
Other	• Other: 4	4

Author's elaboration.

Mean values

All variables in the questionnaire had two items that can be combined for further analysis by taking the mean value from both. The scale used for User Willingness, motivators, and barriers is a five-point Likert scale that ranges from “no approval at all” to “extremely approving.” The mean value of the combined items shows which variables reached a low (< 2.5), middle (> 2.5), or high approval (> 3.5); see Figure 14.

Figure 15: Mean values



Author's elaboration.

One of the high approval mean values (> 3.5) has been reached for the variable that asked for general willingness to use public screens - *user willingness* (UW). Further analysis will investigate the effect of the motivators and barriers.

The highest mean values for the motivators were achieved by:

- *Warnings (M14)*
- *Influence (M10)*
- *Informativity (M5)*

In the category of barriers, the mean values for the following are all in the higher field.:

- *no intuitive understanding (B1)*
- *other user's behavior (B3)*
- *data privacy (B4)*
- *bad usability (B5)*

Only the barrier B2, spending too much time on the interaction, has been valued with middle approval.

Mean values lower than the middle (<2,5) exist for the motivators:

- *Health (M12)*
- *External recognition (M8)*
- *Feedback (M6)*
- *Fun (M2)*

5.5.5.2. *Reliability test*

As was already done for the pretest, **Cronbach's alpha** value was calculated to measure the consistency of the combined scales from two items, as described before. The value was determined using the statistic software JASP (JASP Team, 2025). For this larger sample, the classical Unidimensional Reliability was calculated (Pfadt et al., 2022). The accepted values must equal or exceed .5 and lower than 1 (Taber, 2018). Table 21 contains all values for Cronbach's Alpha, and it's visible that the items are consistent and can be accepted for further analysis.

Table 20: Cronbach's Alpha final study

Scale label	Cronbach's Alpha	Acceptability
M1	.72	Ok.
M2	.81	Ok.
M3	.77	Ok.
M4	.90	Ok.
M5	.74	Ok.
M6	.75	Ok.
M7	.87	Ok.
M8	.79	Ok.
M9	.70	Ok.
M10	.84	Ok.
M11	.72	Ok.
M12	.70	Ok.
M13	.75	Ok.
M14	.60	Ok.
B1	.75	Ok.
B2	.82	Ok.
B3	.67	Ok.
B4	.85	Ok.
B5	.65	Ok.
UW	.90	Ok.

Author's elaboration.

5.5.5.3. *Inferential Analysis*

A series of inferential analyses was implemented to test the hypotheses derived from the previous theoretical and qualitative foundations.

This part examines which motivators and barriers significantly affect user willingness and whether moderating factors influence this relationship. Therefore, correlation coefficients, regression models, and group comparisons were used.

Pearson's correlation

Pearson's correlation coefficient (r) was used to examine linear relationships between the variables following standard conventions, with $p < .05$ **considered statistically significant**, $p < .01$ **as highly significant**, and $p \geq .05$ **not significant** (Field, 2018).

Effect sizes were interpreted according to Wassertheil & Cohen (Cohen, 1988; Wassertheil & Cohen, 1970) with: $|r| \geq .10$ = **small effect**, $|r| \geq .30$ **medium effect**, and $|r| \geq .5$ **large effect**.

Pearson's correlations overview for all variables is attached in Appendix 5. First, the participants in the survey were asked about their general willingness to use public screens; this construct is measured with the variable *User Willingness (UW)*. Therefore, the effects of the motivators and barriers on this construct of UW are in focus.

Significant positive correlations of **high** effect size were found between *User Willingness (UW)* and:

- *Autonomy (M1)*, $r = .57$, $p < .001$
- *Individualism (M3)*, $r = .47$, $p < .001$
- *Competence (M7)*, $r = .48$, $p < .001$

This result indicates that the experience of Autonomy, Individualism, and Competence plays a key role in shaping users' willingness to interact with public screens.

In addition, significant positive correlations of **medium** effect size were found between *User Willingness (UW)* and **all other motivators**, with r ranging from .31 to .44 and $p < .001$.

These results suggest that the assessed motivators are also positively associated with participants' willingness to engage in public screen interactions.

Among the five **barriers** and *User Willingness (UW)* correlations, only three show significant negative correlations, which means the stronger a barrier was rated in the survey, the lower the user's willingness to interact with the screen. The three **barriers** correlated negatively with (UW):

- *Need to spend a lot of time (B2)*, $r = -.24, p < .001$
- *Other User's behavior (B3)*, $r = -.23, p < .001$
- *Data privacy (B4)*, $r = -.23, p < .001$

The $|r|$ values $\geq .10$ represent **small effect** sizes, so it can be assumed that their impact may be limited.

Linear Regression

The correlation analysis revealed that three motivators appear to influence *User Willingness (UW)* strongly. A multiple linear regression analysis was used to calculate the predictive power of the motivators (independent variables) for the User Willingness (dependent variable) and explain its variance. Moreover, the model tests which predictor is the strongest when all are present simultaneously.

Effect size interpretation for the linear regression was based on Cohen's classification of R^2 , where values above .26 are considered significant with a large effect (Cohen, 1988). The adjusted R^2 was used to account for the number of predictors.

The model, including the three motivators *Autonomy (M1)*, *Individualism (M3)*, and *Competence (M7)* as predictors, explained 41% of the variance in general *User Willingness (UW)* ($R^2 = .41$), which is a substantial amount. According to Cohen, this represents a large effect.

Moderating factors: Gender, Generation, and Education

The following analyses have been implemented to explore whether motivational differences exist between different genders, ages, or education levels.

Only the motivators that turned out to be predictors for *User Willingness* (*Autonomy, Individualism, Competence*), the motivators with the highest mean values (*Warnings, Influence, Informativity*), and the barriers with middle effect sizes on *User Willingness* (*Need to spend a lot of time, Other User's behavior, Data privacy*) and *User Willingness* were analyzed in the following part to use only relevant variables.

Gender:

Independent samples *t*-test with p as the significance value was used to examine relationships between the variables following standard conventions, with $p < .05$ considered statistically significant, $p < .01$ as highly significant, and $p \geq .05$ as not significant (Field, 2018).

Cohen's d was applied to measure the effect size of Gender on the three motivators with the highest mean value, the three motivators with high effect size, and the three barriers with a middle effect size in the correlation analysis. The interpretation of d follows Cohen (Cohen, 1988), where $|d| \geq .20$ = small effect, $|d| \geq .50$ medium effect, $|d| \geq .80$ large effect, and $|d| \geq 1.00$ very large effect.

Moreover, Levene's test assesses the assumption of homogeneity of variance. The p -value was used to determine whether the assumption of equal variances was met. If p was insignificant ($p \geq .05$), the standard *t*-test output was interpreted. Otherwise, the Welch correction for unequal variances was applied (Field, 2018). The p -values listed below belong to the *t*-test, not Levene's test.

The results for the *t*-test with the variable *Gender* are listed in Figure 16.

Figure 16: Independent Sample T-test Gender

	Test	Statistic	df	p	Cohen's d
UW	Student	2.183	192.000	0.030	0.320
	Welch	2.161	159.553	0.032	0.318
M14	Student	2.294	192.000	0.023	0.336
	Welch	2.216	145.343	0.028	0.330
M10	Student	2.665	192.000	0.008	0.390
	Welch	2.562	142.408	0.011	0.382
M5	Student	3.988	192.000	< .001	0.584
	Welch	3.894	151.341	< .001	0.577
B3	Student	0.150	192.000	0.881	0.022
	Welch	0.145	143.994	0.885	0.022
B4	Student	0.302	192.000	0.763	0.044
	Welch	0.298	157.024	0.766	0.044
B2	Student	-0.225	192.000	0.822	-0.033
	Welch	-0.219	149.808	0.827	-0.033
M3	Student	4.448	192.000	< .001	0.651
	Welch	4.325	148.953	< .001	0.642
M7	Student	4.749	192.000	< .001	0.695
	Welch	4.653	153.411	< .001	0.688
M1	Student	2.973	192.000	0.003	0.435
	Welch	2.946	159.980	0.004	0.433

Created by Author with Jasp (JASP Team, 2025).

The data from Figure 16 indicate that for *Informativity (M5)*, *Individualism (M3)*, and *Competence (M7)*, significant results were obtained with a medium effect size. In contrast, the other motivators and barriers have small or insignificant effect sizes.

Informativity (M5) received higher approval from **female** participants with a **mean value of 3.97 (male = 3.44)**. Similarly, *Individualism (M3)* showed a higher mean value among women than men (**female = 3.6; male = 3.0**). *Competence (M7)* was also rated higher by women than men (**female = 3.3; male = 2.5**).

The general *user's willingness (UW)* to interact with public screens had a significant result, but only a small effect size. The mean value of **women's** approval is **3.85**, and for **men**, **3.51**.

Generation:

To investigate if there is a significant influence of the participants' age and their general willingness to interact with public screens, a one-way analysis of variance (ANOVA) was conducted (Döring & Bortz, 2016; Field, 2018). Again, p was used to test significance, with $p < .05$ **considered statistically significant**, $p < .01$ **as highly significant**, and $p \geq .05$ **as not significant** (Field, 2018). No fixed scale exists for interpreting the F value. According to Field, values near one are interpreted as groups with low differences, while larger values indicate that between-group variance is higher than within-group variance.

The independent variable was *Generation* (Baby Boomer, Gen X, Gen Y, Gen Z), and the dependent variable was *User Willingness*, measured on a continuous scale. The analysis was based on $N = 44$ Baby Boomers, $N = 51$ Gen X, $N = 72$ Gen Y, and $N = 33$ Gen Z.

The analysis revealed that the effect of *Generation* on the *User Willingness* to interact with public screens was not statistically significant, $F(3, 196) = 1.85$, $p = .140$ (Field, 2018). However, the statistics showed an increasing mean value across generations, see Figure 17.

Figure 17: ANOVA Generations

Generations	N	Mean
Baby Boomers	44	3.466
Gen X	51	3.598
Gen Y	72	3.799
Gen Z	33	3.985

Created by Author with Jasp (JASP Team, 2025).

Younger people rated the *User Willingness* with higher approval than older people, which seems to be an observable tendency.

The results for the analysis of **generational effects** on the **motivators** and **barriers** are listed in the following:

- *Autonomy (M1)*, $F(3, 196) = 2.80$, $p = .041 \rightarrow$ **significant**
- *Individualism (M3)*, $F(3, 196) = 1.07$, $p = .363 \rightarrow$ not significant
- *Competence (M7)*, $F(3, 196) = 2.16$, $p = .094 \rightarrow$ not significant, but shows a **trend**
- *Warnings (M14)*, $F(3, 196) = 8.12$, $p < .001 \rightarrow$ **highly significant**
- *Influence (M10)*, $F(3, 196) = 5.28$, $p = .002 \rightarrow$ **significant**
- *Informativity (M5)*, $F(3, 196) = 0.88$, $p = .45 \rightarrow$ not significant
- *Need to spend a lot of time (B2)*, $F(3, 196) = 6.78$, $p < .001 \rightarrow$ **highly significant**
- *Other User's behavior (B3)*, $F(3, 196) = 2.01$, $p = .114 \rightarrow$ not significant, but shows a **trend**
- *Data privacy (B4)*, $F(3, 196) = 5.03$, $p = .002 \rightarrow$ **significant**

Significant effects were found for *Autonomy (M1)*, *Warnings (M14)*, *Influence (M10)*, *Need to spend a lot of time (B2)*, and *Data privacy (B4)*.

The **mean values** show that the younger the generation, the higher the rating for *Autonomy (M1)*; see Figure 18.

Figure 18: Mean Values ANOVA M1

Generations	N	Mean
Baby Boomers	44	3.227
Gen X	51	3.480
Gen Y	72	3.674
Gen Z	33	3.697

Created by Author with Jasp (JASP Team, 2025).

The same increasing values apply for *Autonomy (M1)* as for *Warnings (M14)*, but the gap between the mean values per generation is higher; see Appendix 7.

As with *Warnings* (M14), the distances for *Influence* (M10) are the same except between the two youngest generations, which is significantly smaller. However, the values increase in the younger groups; see Appendix 8.

The highly significant generational effect of *Needing to spend a lot of time* (B2) indicates that different generations evaluate the barrier differently. The mean values show that Gen Y and Baby Boomers report quite similar high approvals, while Gen X has slightly lower approvals; see Appendix 9. However, the most notable difference is between Gen Z and the other groups. Gen Z rated the time-related effort substantially lower.

Data privacy (B4) revealed significant generational differences in the perception of data protection as a barrier. The mean values show a decreasing trend from the oldest to the youngest generations; see Appendix 10.

Observable tendencies were seen for *Competence* (M7) and *Other User's behavior* (B3). The mean values increase for both motivators, from the Baby Boomers to the younger participants; see Appendix 11-12. But in both cases, the youngest group has the smallest mean value.

For *Individualism* (M3) and *Informativity* (M5), there is no significant difference between the generations.

Education:

The detailed results of the Independent Sample T-test with *Education* are visible in Appendix 6.

The *Education* of the participants was grouped into low, intermediate, high, and others. Because the number of low and others is only 6, they were excluded from this analysis. It is crucial to notice that the results can only be interpreted concerning participants with a high or medium level of education, where the higher educated person count is 136, and the middle is 56. This means that the majority of respondents have a high level of education.

The Independent Sample T-test showed no statistically significant differences between participants with medium or high *Education* levels regarding their general user willingness or the selected motivators and barriers. However, small effect sizes exist for *Individualism* (M3), *Competence* (M7), and *User Willingness* (UW), suggesting education could play a role in shaping motivational drivers and the willingness to interact with public screens. While the results reached no statistical significance, they should be investigated further with larger groups and more participants from lower education levels.

The following section interprets the key results from the analyses and contrasts them with expectations derived from the previous foundation.

5.5.5.4. *Interpretation of Key Findings*

The descriptive data analysis showed that the motivators with the highest average mean values were *Warnings* (M14), *Influence* (M10), and *Informativity* (M10). The correlation and regression analyses identified three additional motivators as significant predictors of User Willingness (UW). This interesting result shows the importance of analyzing not only the user's subjective preferences but also the influence of motivators on actual behavioral intention.

In the case of the study, it appeared that the respondents who found it interesting to use public screens for Warnings, Influence, and Informativity were not the ones who gave a high approval for general willingness to interact with public screens. The participants who are willing to interact with public screens with high approval prefer *Autonomy* (M1), *Individualism* (M3), and *Competence* (M7) applications. These motivators explained 41% of the variance in user willingness. In the context of social and psychological research, this level is considered high, underscoring the relevance of the selected motivators (Cohen, 1988). These findings highlight the model's potential to provide an empirical basis for future research on human-public-screen interaction.

Moreover, all other motivators appeared to correlate significantly with *User Willingness* (UW) but with a medium effect size. This suggests that while all contribute to interaction to some extent, their explanatory power may overlap, making it challenging to create a differentiated and meaningful model from them.

Therefore, the framework will focus on the most potent motivators and include the others as supporting factors.

Only considering the mean values of the motivators and barriers ranking from the questionnaire, it is evident that some motivators have neither a high approval rating nor a significant influence on the user's interaction willingness. These are *Health (M12)*, *External recognition (M8)*, *Feedback (M6)*, and *Fun (M2)*.

This finding suggests that these four motivators may not be perceived as personally relevant or contextually appropriate in the setting of public screens. *Health (M12)* and *Feedback (M6)* might be more effective in private or controlled environments than in public, socially visible spaces.

A possible explanation for the low approval of *Fun (M2)* is that playful elements are not perceived as worthwhile enough to justify attention and interaction in busy everyday contexts.

These insights underscore the importance of context-sensitive motivator selection and support the notion that only some of the commonly known motivators can be effectively translated into actual interaction drivers in the context of HPSI.

The ANOVA analyses have been conducted to investigate whether motivational differences exist between different genders, ages, or educational levels. Only the motivators that turned out to be predictors for User Willingness (*Autonomy, Individualism, Competence*), the motivators with the highest mean values (*Warnings, Influence, Informativity*), and the barriers with middle effect sizes on User Willingness (*Need to spend a lot of time, Other User's behavior, Data privacy*) and *User Willingness* were analyzed in that part to use only relevant variables.

Gender-Specific Patterns

The study sample was not gender-balanced, which is critical to note.

Approximately 47% more female participants than males answered the questionnaire. This unequal distribution may have influenced the strength of gender-related effects, even if the sample sizes of both groups are sufficient for statistical comparison (Field, 2018). Therefore, interpreting the described differences in ratings should be conducted carefully, as a larger group has a greater influence on aggregate measures.

Nonetheless, these gender differences reached statistical significance despite the unbalanced groups, suggesting that the patterns are robust and not only attributed to the sample sizes.

The analysis of existing effects between Gender and the six most relevant motivators and three barriers, *Informativity (M5)*, *Individualism (M3)*, and *Competence (M7)*, yielded significant results. The medium effect sizes suggest that these motivators should be treated as gender-specific.

Informativity (M5), the wish to gain helpful information through public-screen interaction, received higher approval from women than from men. Public screens that offer easily accessible information, such as local updates or tourist information, may effectively encourage interaction among female users.

Similarly, *Individualism (M3)*, which captures self-expression and personalized interaction, was also rated higher by women.

The most considerable approval difference appeared in *Competence (M7)*, which was rated by women with a mean value of 3.3, compared to 2.5 by men. This finding may suggest that women perceive interactions with public screens as valuable, especially when they can reinforce their competencies and self-esteem. For example, applications that offer this expansion of expertise – access to a learning platform – could inspire women to interact with screens.

Moreover, the analysis discovered a significantly higher *User Willingness (UW)* for women interacting on public screens. Even if the effect was small, it can hint at gender-specific encouragement for this technology. Women seemed to be more open or interested in interacting with a public screen when they gained a benefit.

This may be related to the higher ratings of several motivators from female participants, indicating a more general positive expectation towards the user experience.

However, these findings should be verified in future studies with more balanced samples, as the effect observed in this study was small.

Generation-Specific Patterns

The ANOVA analysis revealed several generational differences regarding the motivators and barriers to interacting with public screens.

Significant effects were found for *Autonomy* (M1), *Warnings* (M14), *Influence* (M10), *Need to spend a lot of time* (B2), and *Data privacy* (B4). These findings suggest that these factors are more sensitive to generational differences than others.

The mean value of *Autonomy* (M1) indicates that younger generations (Gen Y and Gen Z) appreciate autonomous experience in public screen interaction more than older generations, particularly Baby Boomers. This aligns with existing research that highlights autonomy as a key motivator for technology users, who expect more individual control in digital interactions (Ryan & Deci, 2000; Venkatesh et al., 2003).

For *Warnings* (M14), a clear upward trend was observed, suggesting that younger participants are more interested in security topics as motivators for interaction with public screens. Gen Y and Gen Z may perceive warnings as more engaging because they grew up with global information about climate change, extreme weather events, pandemics, and terrorism, which can increase their risk perception. Moreover, as digital natives, they are accustomed to receiving various alerts on their smartphones and using them as mobile safety management systems. This fact could make a security application for younger generations more natural and useful on public screens.

Additionally, the literature indicates that younger people value self-efficacy, so actively using a public screen to address security issues can fulfill this need (Appelbaum et al., 2004; Kupperschmidt, 2000).

Although Gen Y and Baby Boomers report similarly high scores for *Need to Spend a Lot of Time (B2)*, the most notable difference appears between Gen Z and the other cohorts. Gen Z rated this barrier much lower, suggesting that younger individuals perceive public screen interactions as more intuitive, possibly due to higher digital familiarity associated with technology use.

This finding supports previous assumptions that digital expertise reduces perceived barriers, especially regarding time effort, which may affect willingness to interact in fast-paced public environments.

Data privacy (B4) revealed significant generational differences in the perception of it as a barrier. The mean values show a decreasing trend from the oldest to the youngest generations; see Appendix 10. These results show that older participants (especially Baby Boomers and Gen X) feel greater concerns about data privacy in public screen interactions than younger participants. Gen Z, whose mean rating is substantially lower, seems to accept data entries better for technology interaction.

This habit could be explained by the fact that this younger generation is highly used to interacting and sharing data with different technologies and digital social platforms (Taddicken, 2014).

In contrast, older users are more cautious with Data privacy, which may be due to a greater skepticism towards data collection and observation in public spaces (Blank et al., 2018).

Observable tendencies were seen for *Competence (M7)* and *Other User's behavior (B3)*. For both, the mean values increase from older to younger generations, except for Gen Z, which has the smallest mean value.

Younger people seem motivated to gain or improve their competence, which is evident from the higher mean values for younger individuals compared to older ones. However, there is a shift in perception among Gen Z. Perhaps Gen Z is not interested in learning about public screens because they are already satisfied with their everyday lives. Many Gen Z users are still in school or higher education; additional learning may not be valuable.

The fact that older generations are more influenced by others' opinions is explained in Venkatesh's UTAUT model (Venkatesh et al., 2003). However, the present study shows different results. Younger people seem to be more sensitive to public perception. Interestingly, this trend does not continue with Gen Z, who gave the lowest approval for this barrier. A possible explanation is that the youngest group grew up in a culture where they were constantly visible through digital self-presentation, making social observation less uncomfortable.

For *Individualism (M3)* and *Informativity (M5)*, there is no significant difference between the generations.

Education

An Independent Sample T-test was implemented to identify patterns regarding the education levels of the participants, motivators, and user willingness. The results showed no statistically significant differences between participants with medium or high education levels in terms of their general willingness to use and the selected motivators and barriers.

Although no significant results were observed, small effect sizes were noted for *Individualism (M3)*, *Competence (M7)*, and *User Willingness (UW)*. This suggests that education could shape motivational drivers and the willingness to interact with public screens. They should be explored again with larger groups, including a balanced number of participants from all education levels.

5.6. HUMAN-PUBLIC-SCREEN INTERACTION FRAMEWORK

The HPSI Framework was developed to identify and manage the main drivers, barriers, and moderating factors that influence user willingness to interact with public screens. This framework focuses on user motivation, in contrast to the technology-centric approach of the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003).

The framework serves researchers as a foundation for further investigations and gives insights into the newly defined field of Human-public-screen interaction.

For practitioners, the framework provides engaging factors and key considerations when creating applications for public screens that support user interaction. Such applications can change the current perception of public screens into an active, helpful part of our living environments.

The structure of the framework is divided into:

1. **Key motivators**
2. **Barriers**
3. **Moderating factors**
4. **Visual model**

Each level, from one to three, explains or influences the central construct: Users' willingness to interact with public screens. The visual model compresses the information into a nutshell.

1. **Key motivators**

Three motivators show a high predictive power for user willingness to interact with a public screen, as shown in Table 22. Applications on public screens that address one or more of these motivators will engage many people with high probability.

Table 21: Predictors for User Willingness

Motivator	Description
Autonomy	Act independently and influence one's environment or digital content on public screens.
Competence	The longing to feel effective and capable; an example given through a learning experience.
Individualism	The wish is to address personal identity, preferences, and uniqueness, such as customized offers.

Author's elaboration.

Table 23 includes motivators that arouse users' interest in public screen applications but might not result in interaction. These motivators should be used as supporting factors for interactive designs or when only attention, but not interaction, is needed.

Table 22: Supporting motivators

Motivator	Description
Warnings/security	The desire to feel safe and informed about potential risks.
Influence	The ability to help shape one's living surroundings.
Informativity	Access to information, such as local educational content, for example.

Author's elaboration.

2. Barriers

The barriers in Table 24 affect users' willingness to interact with public screens. However, they affect the intention of interaction and are also perceived as important factors concerning public screens. When creating applications for public screens that aim to involve users, the named barriers should be considered and avoided.

Table 23: Barriers to application design

Barrier	Description
Time Effort	The time needed to be spent on the screen for the interaction.
Social Observation	Fear of being watched or judged by other people during the interaction.
Data Privacy	Unclear data use and personal data sharing.
No intuitive understanding	Absence of a clear and immediate comprehensible design.
Bad usability	Technical unreliability makes the interaction frustrating.

Author's elaboration.

3. Moderating Factors

Especially if specific target groups are to be addressed with public screen applications, the information in Table 25 should be considered.

Table 24: Moderating Factors

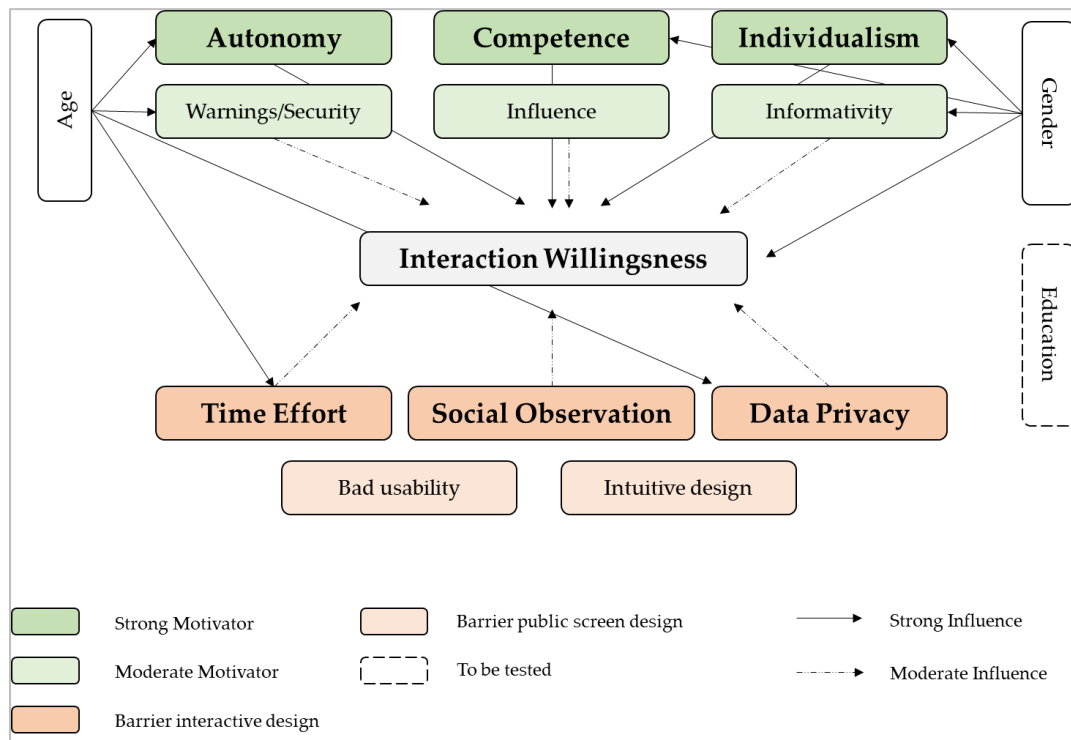
Factor	Key Observations
Gender	Women are more attracted to gaining <i>competence</i> , <i>information</i> , and <i>individualism</i> than men. Women are more open to use interactive public screen applications.
Age/Generation	Younger users (Generation Y and Z) value the experience of <i>autonomy</i> and are interested in warnings/security. Gen Z has fewer concerns about time spending and data privacy than other generations.
Education	It should be tested with a balanced, educated group.

Author's elaboration.

4. Visual model

Figure 19 comprises all named motivators, barriers, and moderating factors that affect human-public-screen interaction. The arrow format shows if there is a strong or moderate effect on the willingness to interact with public screens. Moreover, the moderating factors of age and gender can impact the motivators or barriers.

Figure 19: Human-public-screen interaction model



Author's elaboration.

Despite the barriers influencing interaction, the two barriers listed were rated as essential factors regarding public screen applications (bad usability, intuitive design).

The moderating factor of education showed no effects in this study, but should be tested again because the participants had no balanced education levels.

VI – DISCUSSION

VI -DISCUSSION

The discussion includes three subchapters, viewing the results of the quantitative study in the context of the theoretical assumptions, and qualitative expert insights. The study's key findings are compared with the objectives and evaluated regarding the answers to the research questions. Moreover, the discussion reflects practical implications for designing and implementing interactive screens in public environments.

The chapter is structured into the following: First, the validation of the research hypotheses and setting the results into a theoretical context for reflection (6.1). The empirical data are combined with the experts' insights to derive particular application recommendations in the second section (6.2). Finally, the last part addresses the potential long-term impact of the relevant HPSI motivators (6.3).

6.1. THEORETICAL CONTEXT AND REFLECTION

The current chapter discusses the key findings of the quantitative study results concerning the previously conceptualized hypotheses. The aim is to set the interpretation into the theoretical context of HPSI. The first hypothesis was:

H1: The fourteen discovered motivators significantly engage people to interact with public screens.

The quantitative study confirmed hypothesis H1 through the significant positive correlations between the motivators and users' willingness to interact with the public screen. This result showed that all found motivators have a general relevance.

Autonomy, Individualism, and Competence emerged as the most important motivators for the will to interact with public screens. They seemed to strongly influence whether people are open to public-screen interaction and have high predictive power (Cohen, 1988). *Autonomy* and *Competence* are intrinsic motivators, and following Deci & Ryan, they are basic human needs (Deci & Ryan, 2000).

The researchers identify relatedness as a third basic need that is part of the HPSI study model as the motivator of *Belongingness*. Interestingly, this third basic need does not play a central role in HPSI. Suggesting that HPSI is perceived as individual, personal, and purpose-bounded. Moreover, one main aspect of urban sociology is anonymity, contrary to belongingness (Sutko & de Souza e Silva, 2011). This result raises the question of whether public screens should intentionally support social interaction in civic space or if simply a social experience is not applicable.

Moreover, the three motivators, *Informativity*, *Influence*, and *Warnings*, generally have a high subjective relevance regarding public screen applications. They achieved high subjective approval from the study's participants. Still, they did not affect the intention of the actual interaction, which indicates a gap between general relevance and public screen applications without impact on behavior. This finding suggested that users may value certain content types without necessarily being engaged to interact with the screen.

Summarized, the empirical data support H1 and confirm the engagement effect of all motivators in the context of HPSI, but with different weighting.

H2: People perceive the eight discovered barriers as significantly interfering with public screen interaction.

The H2 can only be partially validated by the study. All barriers gained intermediate or high approvals from the participants and seemed generally important. However, only three of them correlated negatively with user willingness. *Time effort*, *Social observation*, and *Data Privacy* can impact actual behavioral intention, but they only have small effect sizes.

Barriers concerning usability and design have been mentioned in literature and by experts as relevant factors, but have shown no statistically significant results. This may be explained by the study's scenario-based concept, which abstracted the visual constraints. It may be that such barriers would have a more substantial effect in real-world scenarios. This highlights a possible limitation of survey-based research in capturing situational constraints.

Furthermore, the low impact of barriers indicates that users may not avoid interaction with public screens because of existing barriers, but maybe because they do not gain a sufficient advantage.

In conclusion, barriers should be observed, but they seem to have limited effects on HPSI.

H3: The respondents' education, age, and gender significantly influence how strong the approval for each motivator, barrier, and general willingness for public-screen interaction is.

Hypothesis H3 has been validated, but only gender and age have significantly influenced the selected motivators. Education had no measurable effect in the study, but the sample had no balanced education levels. The sample had a high overall education level. Therefore, the absence of significant effects must be interpreted with caution.

Women were more likely to approve of the overall willingness for human-public-screen interaction than men. Moreover, they rated *Informativity*, *Competence*, and *Individualism* significantly higher. Regarding the moderating factor of age, the study showed that younger participants (Gen Y and Z) were more motivated by *Autonomy* and *Warnings* and seemed less concerned by *Data privacy* or *Time effort*.

These findings align with the social science literature's generated theoretical foundations and underline the importance of age-sensitive design implications for HPSI.

From a broader theoretical perspective, the results align with the central assumptions of Deci & Ryan, who emphasize *Autonomy* and *Competence* as key drivers of motivation (Deci & Ryan, 1985; Ryan & Deci, 2000). In the context of human needs concepts, researchers Sheldon et al. highlighted that these two motivators have a greater impact on satisfaction than other needs (Sheldon et al., 2001). So, acting self-determinedly and experiencing a sense of personal development and effectiveness seem to be strong, attractive reasons for users to interact with public screens.

Unlike *Autonomy* and *Competence*, the motivator *Individualism* was not derived from the psychological models examined in this thesis. Its inclusion was motivated by findings from generational research, which characterized the Baby Boomers, Generation X, and Generation Z as individualists (Chaney et al., 2017; Dolot, 2018; Kupperschmidt, 2000; Twenge, 2017).

The high impact of *Individualism* in the context of HPSI reflects the importance of personalized content in public spaces.

Overall, the findings underscore that isolated motivational constructs are not suitable to explore HPSI. Instead, the results share similarities with several theoretical models, presented in the literature analysis. Consistent with the Unified Theory of Acceptance and Use of Technology (UTAUT), the expectations about the *usability* influence the intention to interact with the technology (Venkatesh et al., 2003). When users perceive an intuitive frontend and less effort to understand the application, it is much more probable that they will utilize it.

Another parallel is the importance of deriving *informational value* from public screen interaction, which is comparable to the *expectation of performance* in terms of usefulness.

In addition, in UTAUT, the role of social influence is highlighted, which is similar to the effect of *Other Users' Behavior*, underscored in this study. Humans are social beings and use observation of others' behavior for learning, among other things. It is therefore understandable that this affects one's own behavior.

At the same time, the HPSI Framework extends the UTAUT model by the intrinsic motivators *Autonomy* and *Individualism*. The results of this thesis proved the fundamental role of motivational psychology, as these two are part of the strong predictors for *Users' Willingness* to interact with public screens.

In comparison to UTAUT, the Self-Determination Theory focuses on such motivational drivers and should be combined with UTAUT for HPSI research, as it has been done here.

Some findings differed from expectations gained from the literature analysis. For example, having *Fun* showed no particular relevance in the context of HPSI. The constraints of public settings could explain this discrepancy. In contrast, the value of *informativity* demonstrates that public screens are considered more as useful tools than as an entertainment activity.

Such differences highlight that the context of public screens has to be taken into account when examining HPSI.

Moreover, the study explored whether there are measurable sociodemographic effects. Even if there have not been any strong patterns, it has become visible that younger participants are slightly more open to HPSI and less concerned about data privacy. Gender differences were not noticeably recognizable. The effect of education level influence was not reliably measurable, because the sample was not balanced regarding this aspect. Future research could test such moderating factors more focused.

Even if the methodology of this thesis provided instruments to ensure the reliability and validity of the results, the expert interviews and the survey rely on self-reported data. This approach leads to the risk of inaccuracies due to desirability bias or differences in the imagination of the application examples. In the future, the results should be verified by field experiments.

Moreover, this thesis only focused on motivational drivers but left cultural factors unexplored. The culture and contextual aspects should be investigated in HPSI research, as they have an impact on human behavior.

But how could the results of the study be applied to public screens, which should generally address a mass of people?

The following chapter will give an overview of practical application advice and ideas gained from the expert interviews and the data of this study.

6.2. PRACTICAL APPLICABILITY

The combined insights from expert interviews and the quantitative study reveal recommendations for designing interactive public screen applications. While the qualitative findings offer practical considerations, the quantitative data clarify which motivators will most likely lead to user interaction. Together, these findings provide a solid foundation for deriving effective design strategies, which will be presented in the following. While the HPSI Framework focuses on academic and theoretical use, this chapter gives applied insights and concrete examples.

1. Personalized content

The experts emphasized that context-sensitive and personalized content is a clear success factor for public screen applications. This aligns with the strong influence of the motivator *Individualism*, which was rated significantly higher by female participants and substantially affected user willingness to interact.

Yvonne Schroerschwarz highlighted that different user groups respond to different motivators and that there is no overall working motivator. Therefore, interactive applications should have a content extension visible on the users' mobile devices using QR Code scan or NFC (Near Field Communication) technology. Such content should adapt to the preferences or context of the user.

For instance, current local information, such as the weather and the users' position, could easily be used. Moreover, an option could be offered to give more personal details to get stronger, individualized content.

Examples of such content are individual event tips or tailored coupons.

2. Competence Supporting Features

The literature and several interviewees pointed out that the feeling of being capable or extending competencies motivates people. The study's data proved the assumption that *Competence* is a strong, engaging factor, as it has a high predictive power for interaction willingness.

Schroerschwarz explained that gaining competence lasts longer than collecting coins, emphasizing a long-term engagement potential.

As an application example, quizzes with feedback and several levels could be implemented within the context of an advertising or local topic. Moreover, language skills could be improved as part of a campaign broadcast in places where many foreigners stay. This could support integration interests.

3. Autonomy and Participation

Sebastian Thelen and Christian von den Brincken underlined the impact of letting users feel self-sufficient through voting features, idea submissions, or co-determining screen content. This has been confirmed by the statistical analysis that presented *Autonomy* as a powerful predictor for HPSI.

These insights suggest that incorporating a participation mechanism into application design can facilitate user interaction. For example, users could vote for local improvements or suggest their ideas and content preferences. Such public screen use could strengthen communities and bring interpersonal exchange into the public space.

4. Fast, Efficient, and Rewarding Interaction

Experts agree that public interactions must be smooth, intuitive, and offer immediate value to the user. In addition, they explain that campaigns that failed often lacked a clear, obvious benefit. Thelen noted that users will pass by if there's no direct gain. Moreover, von den Brincken mentions that German users are more likely to interact when the technology is already part of their everyday lives. QR scanning, for example, was widespread due to the coronavirus pandemic as a hygienic intervention, so people got used to it.

Regarding efficient usability, Schroerschwarz recommends using popular navigation design elements so users can orient themselves intuitively.

The experts' input aligns with the quantitative study, showing barriers such as *Time Effort* and *Data Privacy* were perceived as disturbing, although not distracting.

Design implication for HPSI is that there should be a clear call-to-action, showing what the user must do (for example, "Scan the QR Code").

Equally important is a direct reference to the benefit, such as “to get a free ice cream.” Especially when people are walking, the application must work uncomplicatedly without the time-consuming need for much input.

To avoid such issues, Thelen recommends implementing HPSI rules that manage where interactive applications are allowed. Moreover, everyday technologies and intuitive prominent design elements should be implemented.

5. Public Visibility vs. Privacy

Many of the study’s participants rated *Other Users’ Behavior* as disturbing for HPSI, including feeling observed while interacting. In addition, the motivator *Belongingness* showed no significant motivational effect, and experts were skeptical about high social interaction in public spaces. Von den Brincken mentioned that users feel uncomfortable performing publicly for technical interaction.

As HPSI is initially public, there is a need to let the actual interaction happen privately to make users feel comfortable. Using the mobile device as an application extension, the interaction would not be visible to others even if the entry is displayed on public screens.

6. Exclusivity

One success factor for HPSI, as raised by the expert interviews, is that the content has to be exclusive. If users can access the same content without needing public screen interaction, they will lack motivation to use the application.

That means interactive public screen applications could be used when people need to easily access information independently of personal devices. Erhardt, for example, explains that such screens are helpful for the interaction between citizens and municipal institutions. Users can access information on-site in several languages, thereby relieving employees from having to answer these questions and avoiding communication problems.

More exclusive content could be personalized vouchers or digital collection elements from games.

Schroerswarz added that gamification and reward systems content have the potential to let people repeat interaction. Short-term incentives could be a strong driver for introducing interactive screen applications to the public.

7. Attract attention

The experts stressed the importance of attracting attention from out-of-home media. Thelen recommends unique and innovative screen designs, such as botanical elements, unexpected places for mobile public screens, or special embeddings in oversized objects. Moreover, he explains that dynamic content attracts more attention than static content.

8. Context-sensitivity

Thelen points out that public screen applications that engage users must be implemented context-sensitively. If the user has to stop walking to scan a code, for example, there should be no bottleneck of passers-by, nor should it be implemented in road traffic. People might perceive the applications as disturbing or unable to use them in such environments.

Moreover, time-consuming applications such as quizzes will only be used in waiting or sitting situations, like at bus stops or near benches.

Recommendations overview:

Table 26 provides a concise overview of the recommendations for applying HPSI in practice.

Table 25: Design Principles

Nr.	Design component	Empirical Support	Expert Insight	Example
1	Personalization	<i>Individualism</i> (M3) highly affects the willingness to	(Schroerswarz) Different user groups have	Personalized vouchers or information.

Nr.	Design component	Empirical Support	Expert Insight	Example
		interact with users.	different preferences.	
2	Competence	<i>Competence</i> (M7) significantly predicts willingness to interact with users.	(Schroerschwarz) Competence building is a long-lasting motivator.	Quizzes, learning apps.
3	Autonomy/ participation	<i>Autonomy</i> (M1) is a strong motivator.	(Thelen, von den Brincken) The feeling of self-sufficiency has a high impact.	Voting for local improvements, idea submission.
4	Efficient use/ immediate benefit	<i>Need to spend a lot of time</i> (B2) and <i>Data Privacy</i> (B4) approved important.	(Thelen) Users must notice benefits quickly and easily access applications without much data input.	QR code, NFC.
5	Privacy	<i>Other users' behavior</i> (B3) is rated as a barrier.	(Von den Brincken) Users want to interact privately in public.	Mobile devices as extensions.
6	Exclusivity	It is not part of the	(Erhardt) Content has to be	Create own/new

Nr.	Design component	Empirical Support	Expert Insight	Example
		quantitative study, but can be referred to as <i>Individualism</i> (M3).	exclusive to be motivated for public screen use.	content for applications or provide content that regularly costs money.
7	Attract attention	Not part of the quantitative study.	(Thelen, von den Brincken) There must be an attention-attracting element.	Create innovative screen designs or use mobile screens for surprising placements.
8	Context-sensitivity	Not part of the quantitative study.	(Schroerschwarz, Thelen) The environment and users' situation are crucial success factors for interaction.	Adapt applications to the context or use locations where interaction is suitable.

Author's elaboration.

The recommendations given in this chapter should be combined with the HPSI Framework to create public screen applications that engage their audience. Some aspects are repeated from the conceptual HPSI Framework, but set into a practical context and expanded with expert knowledge.

6.3. THE LONG-TERM IMPACT OF MOTIVATORS

While previous chapters focused on identifying interaction motivators and barriers, this section discusses which motivators from the HPSI Framework may motivate for the long term and why.

According to Deci & Ryan, the experience of *Autonomy* and self-determined behavior leads to sustained motivation (Deci & Ryan, 2008). Moreover, the authors describe that the feeling of being effective and the need for *Competence* are basic needs that support self-efficacy. Gaining *Competence* or expanding existing ones has a long-term effect, especially when the need for Autonomy is satisfied simultaneously.

The Customer and User Experience Designer, Schroerschwartz, explained that gaining *Competence* lasts longer than collecting coins, for example, emphasizing long-term engagement potential.

In addition, she noted that gamification and reward systems can be seen as instruments to support motivators such as having fun and earning exclusive content. Such short-term incentives can motivate people to engage in repeated interactions with public screens, which could be particularly useful for initiating interactions with them.

That means that for the long-term effectiveness of interactive screens, a combination of *extrinsic motivators* such as reward systems and *intrinsic drivers* such as *Competence* may be the most effective. For example, a skill-developing application could reward users for their progress. Intrinsic motivators support the user's internal value system and their identity. This process seems to foster long-term behaviour.

The public environment in HPSI makes long-term motivation challenging. Interaction in publicity is often volatile; therefore, a repetition effect can only occur if the user has repeated points of contact. In addition, if interaction is needed, the users should not be in a hurried situation.

For instance, a digital quiz challenge using the smartphone at a train stop could show a ranking of the users that addresses the short-term gamification satisfaction. The feeling of being competent or gaining knowledge could lead to repeated usage.

Another example is a voting application for local improvements, which can provoke the feeling of self-efficacy. A quick win for the user could be a coupon for a local shop when using the application.

Due to its scenario-based questionnaire design, this study is unsuitable for fully answering the research question. The most relevant motivators would need to be tested in real-world applications over a more extended period to determine their long-term effects.

VII – CONCLUSIONS

VII - CONCLUSIONS

This dissertation first describes the need to shape the research field of Human-Public-Screen Interaction (HPSI) in light of the long-established field of Human-Computer-Interaction (HCI). This part is expressed by **Research Question 1: How can Public-Screen-Interaction be defined and delimited as a research objective?**

A literature review revealed similarities between the two fields, including computer science, psychology, and social science. HPSI is based on the named research fields and explores the relation between humans and public displays within their social contexts (Averbukh, 2021; Olson & Olson, 2003).

The special context of a semi-public interaction, as well as the diverse possible public environments, distinguishes the field of HPSI from HCI. Moreover, there is no need to use public screens, as is the case with computers in a daily work context, for example. The motivation to interact with public displays must therefore stem from a person's inner needs (Hassenzahl & Tractinsky, 2006). This insight leads to **Research Question 2: Which potential stimuli for interaction with public screens exist?**

To explore the motivational drivers for HPSI, a literature review in Chapter 5.3 first analyzed three different psychological motivation models: Deci and Ryan's (1985) model, Maslow's (1943) model, and Venkatesh et al.'s (2003) model. The insights from the models were then combined to apply them to public screen interaction and have been visualized in the Human Motivation Model version 1.

As literature from the psychological models has shown, the gender and age of technology users influence their behavior (Venkatesh et al., 2003). Therefore, the literature review was expanded.

Subsequently, literature from generational studies was utilized to investigate motivators from an alternative research perspective and extend the previous results. The Human Motivation Model has been adapted by incorporating insights from generational research, resulting in Version 2.

The next step in the Motivation Model creation process, as outlined in Chapter 5.4, involved conducting expert interviews to verify the insights gained from the literature and incorporate practical knowledge. These interviews strengthened the assumptions about interaction motivation through the combination of benefits and the attractive design of public screens.

The final conceptualization streamlined and adapted the motivators and barriers to be used in a quantitative study. This final version ensures that the elements are testable in a structured questionnaire format. In sum, it includes fourteen motivators and five barriers.

The described iterative development of the Motivation Model provides a theoretical foundation, practical relevance, and initial validation. The qualitative phase has thus led to the refinement and contextualization of the model for real-world scenarios and its application in a quantitative study.

Chapter 5.5 conducted the transfer of the conceptual preparatory work to empirical testing. Therefore, the motivators and barriers were translated into measurable items. To ensure clarity, reliability, and validity, a multi-stage pretest was implemented, and the items were adjusted as necessary.

This approach proved to be effective and showed at an early stage which questions need to be optimized. Therefore, possible error sources were identified and eliminated.

The quantitative study involved 200 participants from different generations to measure the statistical effects of motivators, barriers, and identified moderating factors, including age. The results supported the assumptions of the theoretical foundation, confirming Hypothesis 1: All fourteen motivators showed significant relevance. Moreover, *Autonomy*, *Competence*, and *Individualism* emerged as particularly influential drivers for public screen interaction.

Hypothesis 2 was partially supported. All barriers were rated as relevant to some degree. Still, only *Time Effort*, *Other Users' Behavior*, and *Data Privacy* had a notable effect on the willingness to interact with public screens.

Design-related barriers that can limit usability showed no significant statistical effects, despite the literature and experts emphasizing them as key factors. As the questionnaire is a scenario-based instrument, users' imagination may not fully reflect such situational constraints, which leads to a missing perception of the barrier as disturbing.

Hypothesis 3 was also partially confirmed: gender and age influenced the approval of specific motivators, whereas education showed no significant effect in the sample. Regarding this, it must be noted that the sample had an unbalanced distribution of education levels. Therefore, the impact should be verified with a more diverse sample.

However, it is noticeable that women showed a slightly higher general willingness to interact with public screens and especially valued applications addressing *Competence*, *Informativity*, and *Individualism*.

Moreover, it emerged that younger people feel less disturbed by data privacy concerns and were motivated when they experience *Autonomy*.

One important discovery of the study is that people may perceive certain factors as generally interesting, but they do not motivate them to interact with the screens. Practitioners, therefore, must distinguish between motivators based on their desired goal: attention or interaction.

All these insights were used to build the Human-Public-Screen Interaction Framework as a key result of this dissertation, presented in Chapter 5.6. The aim of providing a solid foundation for both theoretical and practical usage has been achieved. This Chapter addressed **Research Question 4: Which guidelines can be developed to build an interaction framework for interactive digital public screen usage?**

The last open **Research Question 3 was: Can stimuli increase public screen interaction in the long term?** Chapter 6.3 provided an overview of the insights gained regarding the potential long-term effects of the motivators and offers recommendations for future research.

According to the dissertation's justification, a gap exists in HPSI research, encompassing the two fields of Psychology and Social Science (see II – JUSTIFICATION). From a theoretical perspective, this dissertation helps bridge this gap. The created HPSI framework contributes to understanding what influences people's behavior when they are standing in front of a public screen. In contrast to existing motivational theories, this model incorporates the surrounding public environment and considers the semi-private context. The study examined the psychological and sociological factors that influence technology usage.

For practitioners, the study offers insights and ideas for developers of public screen applications. These guidelines are based on empirical and practical findings, derived from a combination of literature and expert input.

VIII – LIMITATIONS AND FUTURE WORK

VIII - LIMITATIONS AND FUTURE WORK

The thesis developed empirically founded insights into the research field of Human-Public-Screen Interaction. As this field is underrepresented in the literature, the chosen approach was to employ a mixed-methods approach, incorporating multiple perspectives on the topic. This way, it was possible to investigate several aspects from both theoretical and practical directions. This examination contributes to a better understanding of the psychological drivers, as well as sociodemographic and contextual factors, that influence the willingness to interact with public screen applications.

Nonetheless, the study's limitations and the resulting opportunities for future research will be discussed in the following section.

The chosen **mixed-methods design** enabled a comprehensive overview of HPSI and verified information from the qualitative part using quantitative instruments. This procedure helped to identify recurring patterns from different information sources. Apart from that, this approach does not encompass an in-depth investigation of each aspect. For instance, the quantitative part revealed several factors that could influence HPSI but have not been investigated further because they were not applicable to a questionnaire, for example.

While balancing the multiple components of the methods, time constraints lead to content limitations for each of them. By focusing on one method, it may be possible to explore and validate the findings from this study more deeply, which could be the next step in research regarding HPSI.

In addition, future studies should use field experiments by displaying interactive content on public screens to investigate people's behavior in a **real-world setting**. It should be analyzed which environmental, technological, and social factors influence HPSI. There may be more variables that affect interaction, such as screen placement, size, content presentation, weather, weekday, or group dynamics.

Moreover, the barriers and motivators identified in this thesis could be verified. An experimental design would allow for exploring long-term effects, which the thesis could not cover. By observing users directly, behavior that can only be observed in a real environmental context may become visible.

Another limitation concerns the **sample** of the quantitative part. As explained in the corresponding chapter, the sample size is calculated using GPOWER with standard settings to ensure a statistically relevant result. Even if the study included more participants than calculated by GPOWER, the number is not representative of the German population. Despite its size, the sample is not balanced in terms of education level, which limits the significance of its influence. Any observed effect related to the education level in this thesis must be interpreted with caution.

Future work should therefore try to validate and extend the study's results with a larger and more diverse sample.

At least the **scope of the Human-Public-Screen Interaction Framework** offers an empirically grounded overview of motivators, barriers, and moderating factors, but it remains an initial step in HPSI research. As mentioned above, several aspects require in-depth investigation and the use of additional methods. By continuing to explore the field, the framework can be extended and adapted in the future. For example, dynamic factors such as seasons, long-term effects, and changes or adaptive applications corresponding to users' behavior could enrich the framework.

IX – BIBLIOGRAPHICAL REFERENCES

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- Ahmadi, S., Jansen, J. J. P., & Eggers, J. P. (2022). Using Stretch Goals for Idea Generation Among Employees: One Size Does Not Fit All! *Organization Science*, 33(2). <https://doi.org/10.1287/orsc.2021.1462>
- Ahn, J., Clegg, T., Yip, J., Bonsignore, E., Pauw, D., Cabrera, L., Hernly, K., Pitt, C., Mills, K., Salazar, A., Griffing, D., Rick, J., & Marr, R. (2018). Science everywhere: Designing public, tangible displays to connect youth learning across settings. *Conference on Human Factors in Computing Systems - Proceedings, 2018-April*. <https://doi.org/10.1145/3173574.3173852>
- Appelbaum, S. H., Serena, M., & Shapiro, B. T. (2004). Generation X and the boomers: organizational myths and literary realities. *Management Research News*, 27(11–12), 1–28. <https://doi.org/10.1108/01409170410784635>
- Averbukh, V. L. (2021). Evolution of human computer interaction. *Scientific Visualization*, 12(5). <https://doi.org/10.26583/SV.12.5.11>
- Basheer, S., Farooq, S., Hassan, V., Malik, Y. M., & Reshi, M. A. (2023). Augmented reality and virtual reality in cultural heritage tourism enhancing visitor experiences. In *Exploring Culture and Heritage Through Experience Tourism*. <https://doi.org/10.4018/978-1-6684-9957-3.ch002>
- BIELIŃSKA-DUSZA, E. (2022). The Motivation of Generations: What Drives Generation X, Y, Z? *Journal of Human Resources Management Research*. <https://doi.org/10.5171/2022.637177>
- Blank, G., Bolsover, G., & Dubois, E. (2018). A New Privacy Paradox: Young People and Privacy on Social Network Sites. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2479938>
- Blom, J. O., & Monk, A. F. (2003). Theory of personalization of appearance: Why users personalize their PCs and mobile phones. *Human-Computer Interaction*, 18(3), 193–228. https://doi.org/10.1207/S15327051HCI1803_1
- Brignull, H., & Rogers, Y. (2003). Enticing People to Interact with Large Public Displays in Public Spaces. *INTERACT '03: IFIP TC13 International Conference on Human-Computer Interaction*, 17–24.
- Buchkremer, R., Demund, A., Ebener, S., Gampfer, F., Jagering, D., Jurgens, A., Klenke, S., Krimpmann, D., Schmank, J., Spiekermann, M., Wahlers, M., & Wiekpe, M. (2019). The Application of Artificial Intelligence Technologies as a Substitute for Reading and to Support and Enhance the Authoring of Scientific Review Articles. *IEEE Access*, 7, 65263–65276. <https://doi.org/10.1109/ACCESS.2019.2917719>
- Burnett, L., & Spelman, A. (2011). Creative citizenship: Building connection, knowledge, belonging and leadership in young people. *Aplis*, 24(1).
- Cahyadi, E., Bandung, Y., & Wiguna, A. (2012). Application of digital signage for tourism information and communication system. *2012 7th International*

- Conference on Telecommunication Systems, Services, and Applications (TSSA)*, 72–75. <https://doi.org/10.1109/TSSA.2012.6366025>
- Chaney, D., Touzani, M., & Ben Slimane, K. (2017). Marketing to the (new) generations: summary and perspectives. In *Journal of Strategic Marketing* (Vol. 25, Issue 3). <https://doi.org/10.1080/0965254X.2017.1291173>
- Chulef, A. S., Read, S. J., & Walsh, D. A. (2001). A hierarchical taxonomy of human goals. *Motivation and Emotion*, 25(3). <https://doi.org/10.1023/A:1012225223418>
- Cleaver, M., Green, B. C., & Muller, T. E. (2000). Using Consumer Behavior Research to Understand the Baby Boomer Tourist. *Journal of Hospitality and Tourism Research*, 24(2), 274–287. <https://doi.org/10.1177/109634800002400210>
- Cohen, J. (1988). Statistical power analysis for the social sciences (2nd ed.). Lawrence Erlbaum Associates.
- Creswell, J. W. (2014). *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (4th. edition). SAGE Publications.
- Creswell, John W., Fetters, M. D., & Ivankova, N. V. (2004). Designing a mixed methods study in primary care. *Annals of Family Medicine*, 2(1), 7–12. <https://doi.org/10.1370/afm.104>
- Deci, E. L., & Ryan, R. M. (1985). Intrinsic Motivation and Self-Determination in Human Behavior. *Intrinsic Motivation and Self-Determination in Human Behavior*. <https://doi.org/10.1007/978-1-4899-2271-7>
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01
- Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology*, 49(3), 182–185. <https://doi.org/10.1037/A0012801>
- Dohmen, D., & Schmelz, K. (2021). *Datenschutz in der (Corona-)Krise: Selbstbestimmung und Vertrauen im Fokus* (Policy Papers / Cluster of Excellence “The Politics of Inequality,” Issue 05).
- Dolot, A. (2018). New trends in management The Characteristics of Generation Z. *E-Mentor*, 2(2).
- Döring, N., & Bortz, J. (2016). Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften. In *Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften*. Springer, Berlin, Heidelberg.
- Engels, B. (2018). Datenschutzpräferenzen von Jugendlichen in Deutschland. *IW-Trends. Vierteljahresschrift Zur Empirischen Wirtschaftsforschung*, 45(2).
- Erdfelder, E., Faul, F., & Buchner, A. (1996). GPOWER: A general power analysis program. *Behavior Research Methods, Instruments, and Computers*, 28(1). <https://doi.org/10.3758/BF03203630>
- Field, A. P. (2018). Discovering statistics using IBM SPSS statistics: 5th edition. In SAGE Publications, Inc. (Vol. 4, Issue 1).
- Floyd J. Fowler, J. (2014). *Survey Research Methods* (fifth edition). SAGE publications.
- Franke, N., & Schreier, M. (2008). Product uniqueness as a driver of customer utility in mass customization. *Marketing Letters*, 19(2), 93–107.

- <https://doi.org/10.1007/s11002-007-9029-7>
- Gambino, A., Fox, J., & Ratan, R. A. (2020). Building a Stronger CASA: Extending the Computers Are Social Actors Paradigm. *Human-Machine Communication*, 1(1), 71–85. <https://doi.org/10.30658/hmc.1.5>
- Garaus, C., Garaus, M., & Wagner, U. M. (2024). Getting Users Involved in Idea Crowdsourcing Initiatives: An Experimental Approach to Stimulate Intrinsic Motivation and Intention to Submit. *IEEE Transactions on Engineering Management*, 71. <https://doi.org/10.1109/TEM.2024.3352430>
- Garber, C. E., Blissmer, B., Deschenes, M. R., Franklin, B. A., Lamonte, M. J., Lee, I. M., Nieman, D. C., & Swain, D. P. (2011). Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise. *Medicine and Science in Sports and Exercise*, 43(7). <https://doi.org/10.1249/MSS.0b013e318213febf>
- Gollwitzer, P. M. (2018). The goal concept: A helpful tool for theory development and testing in motivation science. *Motivation Science*, 4(3), 185–205. <https://doi.org/10.1037/mot0000115>
- Gollwitzer, P. M., & Oettingen, G. (2015). Motivation and Actions, Psychology of. *International Encyclopedia of the Social & Behavioral Sciences: Second Edition*, 887–893. <https://doi.org/10.1016/B978-0-08-097086-8.26040-6>
- Gurău, C. (2012). A life-stage analysis of consumer loyalty profile: Comparing Generation X and Millennial consumers. *Journal of Consumer Marketing*, 29(2), 103–113. <https://doi.org/10.1108/07363761211206357>
- Hassenzahl, M., & Tractinsky, N. (2006). User experience - A research agenda. *Behaviour and Information Technology*, 25(2), 91–97. <https://doi.org/10.1080/01449290500330331>
- Hershatter, A., & Epstein, M. (2010). Millennials and the world of work: An organization and management perspective. *Journal of Business and Psychology*, 25(2), 211–223. <https://doi.org/10.1007/s10869-010-9160-y>
- Huang, J., & Narayanan, S. (2021). Effects of Attention and Recognition on Engagement, Content Creation and Sharing: Experimental Evidence from an Image Sharing Social Network. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3760804>
- Hüning, L., Böhm, S., & Fugli, U. (2018). Die Auswirkungen von Autonomie, Kompetenz und sozialer Eingebundenheit auf die Gesundheit und Arbeitsfähigkeit von Mitarbeitern. In *Fehlzeiten-Report 2018*. https://doi.org/10.1007/978-3-662-57388-4_23
- JASP Team. (2025). JASP (Version 0.19.3). In [Computer software].
- Jin, J., Gubbi, J., Marusic, S., & Palaniswami, M. (2014). An information framework for creating a smart city through internet of things. *IEEE Internet of Things Journal*, 1(2), 112–121. <https://doi.org/10.1109/JIOT.2013.2296516>
- Jurkiewicz, C. L. (2000). Generation X and the public employee. *Public Personnel Management*, 29(1), 55–74. <https://doi.org/10.1177/009102600002900105>
- Kang, K., Hengeveld, B., Hummels, C., & Hu, J. (2022). Enhancing Social Interaction among Nursing Homes Residents with Interactive Public Display Systems.

- International Journal of Human-Computer Interaction*, 38(17).
<https://doi.org/10.1080/10447318.2021.2016234>
- Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information technology adoption across time: A cross-sectional comparison of pre-adoption and post-adoption beliefs. *MIS Quarterly: Management Information Systems*, 23(2), 183–213. <https://doi.org/10.2307/249751>
- Khoo, E., Mitchell, L., & Sammons, M. (2023). Teacher Use of Digital Stories to Promote Reflective Practice Supportive of Migrant and Refugee Children's Sense of Belonging. *Early Childhood Education Journal*.
<https://doi.org/10.1007/s10643-023-01538-z>
- Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. In *International Journal of Information Management* (Vol. 45, pp. 191–210). Elsevier Ltd.
<https://doi.org/10.1016/j.ijinfomgt.2018.10.013>
- Kupperschmidt, B. R. (2000). Multigeneration employees: strategies for effective management. *The Health Care Manager*, 19(1).
<https://doi.org/10.1097/00126450-200019010-00011>
- Lasrado, S., Ghodinde, A., David, S., & Nivelkar, M. (2021). Surveillance using Digital Signage. *International Research Journal of Engineering and Technology (IRJET)*, 08(02), 275–279.
- Leiner, D., & Leiner, S. (2024). *SoSci Survey ▶ professionelle Onlinebefragung made in Germany*. SoSci Survey GmbH.
- Lindenberg, S., & Steg, L. (2007). Normative, gain and hedonic goal frames guiding environmental behavior. *Journal of Social Issues*, 63(1).
<https://doi.org/10.1111/j.1540-4560.2007.00499.x>
- Malhotra, N. K., Kim, S. S., & Agarwal, J. (2004). Internet users' information privacy concerns (IUIPC): The construct, the scale, and a causal model. In *Information Systems Research* (Vol. 15, Issue 4). <https://doi.org/10.1287/isre.1040.0032>
- Mannheim, K. (1928). Das Problem der Generationen. *Kölner Zeitschrift Für Soziologie Und Sozialpsychologie*, 2, 157–185.
- Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, 50(4), 370–396. <https://doi.org/10.1037/H0054346>
- Mayring, P. (2016). *Einführung in die qualitative Sozialforschung* (6. Auflage). Beltz.
- McClelland, D. C. (1985). How Motives, Skills, and Values Determine What People Do. *American Psychologist*, 40(7). <https://doi.org/10.1037/0003-066X.40.7.812>
- Mou, W. (2023). A Quantitative Analysis of the Relationship between Education Level and Income. *Journal of Education, Humanities and Social Sciences*, 12.
<https://doi.org/10.54097/ehss.v12i.7617>
- Nass, C., Steuer, J., & Tauber, E. R. (1994). Computer are social actors. *Conference on Human Factors in Computing Systems - Proceedings*.
<https://doi.org/10.1145/259963.260288>
- Olson, G. M., & Olson, J. S. (2003). Human-Computer Interaction: Psychological Aspects of the Human Use of Computing. *Annual Review of Psychology*, 54, 491–516. <https://doi.org/10.1146/ANNUREV.PSYCH.54.101601.145044>

- Peltonen, P., Kurvinen, E., Salovaara, A., Jacucci, G., Ilmonen, T., Evans, J., Oulasvirta, A., & Saarikko, P. (2008). "It's mine, don't touch!": Interactions at a large multi-touch display in a city centre. *Conference on Human Factors in Computing Systems - Proceedings*. <https://doi.org/10.1145/1357054.1357255>
- Pfadt, J. M., Bergh, D. van den, Sijtsma, K., & Wagenmakers, E. J. (2022). A tutorial on Bayesian single-test reliability analysis with JASP. *Behavior Research Methods*, 55(3). <https://doi.org/10.3758/s13428-021-01778-0>
- Prensky, M. (2001). Digital Natives, Digital Immigrants Part 1. *On the Horizon*, 9(5). <https://doi.org/10.1108/10748120110424816>
- Ringenson, T., Eriksson, E., Rivera, M. B., & Wangel, J. (2017). The limits of the smart sustainable city. *LIMITS 2017 - Proceedings of the 2017 Workshop on Computing Within Limits*, 3–9. <https://doi.org/10.1145/3080556.3080559>
- Roth-Cohen, O., Rosenberg, H., & Lissitsa, S. (2022). Are you talking to me? Generation X, Y, Z responses to mobile advertising. *Convergence*, 28(3). <https://doi.org/10.1177/13548565211047342>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Saleem, A. N., Noori, N. M., & Ozdamli, F. (2022). Gamification Applications in E-learning: A Literature Review. *Technology, Knowledge and Learning*, 27(1), 139–159. <https://doi.org/10.1007/s10758-020-09487-x>
- Schmank, J., & Buchkremer, R. (2024). Navigating the Digital Public Sphere: An AI-Driven Analysis of Interaction Dynamics across Societal Domains. *Societies*, 14(10), 195. <https://doi.org/10.3390/soc14100195>
- Schmid, M. (2020). Digital out of home displays: Advances, requirements and solutions. *Digest of Technical Papers - SID International Symposium*, 51(1), 1113–1116. <https://doi.org/10.1002/sdtp.14070>
- Schnetzer, S., Hampel, K., & Hurrelmann, K. (2023). Trendstudie: Jugend in Deutschland. *JID23 - Jugend in Deutschland*, 2023. <https://doi.org/10.17169/REFUBIUM-39578>
- Schwieger, D., & Ladwig, C. (2018). Reaching and Retaining the Next Generation: Adapting to the Expectations of Gen Z in the Classroom. In *Information Systems Education Journal (ISEDJ)* (Issue 3).
- Sheldon, K. M., Elliot, A. J., Kim, Y., & Kasser, T. (2001). What is satisfying about satisfying events? Testing 10 candidate psychological needs. *Journal of Personality and Social Psychology*, 80(2). <https://doi.org/10.1037/0022-3514.80.2.325>
- Siricharoen, W. (2019). Understanding Social Interaction with Human Computer Interaction (HCI) Adaptation. *EAI Endorsed Transactions on Context-Aware Systems and Applications*, 6(18), 160762. <https://doi.org/10.4108/eai.13-7-2018.160762>
- Stewart, K. A., & Segars, A. H. (2002). An empirical examination of the concern for information privacy instrument. *Information Systems Research*, 13(1), 36–49. <https://doi.org/10.1287/isre.13.1.36.97>
- Sutko, D. M., & de Souza e Silva, A. (2011). Location-aware mobile media and urban

- sociability. *New Media and Society*, 13(5), 807–823.
<https://doi.org/10.1177/1461444810385202>
- Taber, K. S. (2018). The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education*, 48(6).
<https://doi.org/10.1007/s11165-016-9602-2>
- Taddicken, M. (2014). The "Privacy Paradox" in the Social Web: The Impact of Privacy Concerns, Individual Characteristics, and the Perceived Social Relevance on Different Forms of Self-Disclosure¹. *Journal of Computer-Mediated Communication*, 19(2). <https://doi.org/10.1111/jcc4.12052>
- Tulgan, B. (1996). Managing Generation X: How to Bring Out the Best in Young Talent. *Choice Reviews Online*, 38(08), 38-4558-38-4558.
<https://doi.org/10.5860/CHOICE.38-4558>
- Twenge, J. M. (2017). *iGen: Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy-and Completely Unprepared for Adulthood-and What That Means for the Rest of Us* (Issue 3). Atria Books/ Simon & Schuster US.
- Twenge, J. M., Campbell, S. M., Hoffman, B. J., & Lance, C. E. (2010). Generational differences in work values: Leisure and extrinsic values increasing, social and intrinsic values decreasing. *Journal of Management*, 36(5), 1117–1142.
<https://doi.org/10.1177/0149206309352246>
- Venkatesh, V., & Davis, F. D. (2000). Theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, 46(2).
<https://doi.org/10.1287/mnsc.46.2.186.11926>
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly: Management Information Systems*, 27(3). <https://doi.org/10.2307/30036540>
- Vom Brocke, J., Simons, A., Niehaves, B., Niehaves, B., Reimer, K., Brocke, J., Vom, J., Simons, A., Niehaves, B., Niehaves, B., Reimer, K., Plattfaut, R., & Cleven, A. (2009). Reconstructing the giant: On the importance of rigour in documenting the literature search process. *ECIS 2009 Proceedings*, 161.
- Wassertheil, S., & Cohen, J. (1970). Statistical Power Analysis for the Behavioral Sciences. *Biometrics*, 26(3). <https://doi.org/10.2307/2529115>
- Weber, T., & Buchkremer, R. (2022). Blockchain-Based Reference Architecture for Automated, Transparent, and Notarized Attestation of Compliance Adaptations. *Applied Sciences* 2022, Vol. 12, Page 4531, 12(9), 4531.
<https://doi.org/10.3390/APP12094531>
- Wong, M., Gardiner, E., Lang, W., & Coulon, L. (2008). Generational differences in personality and motivation: Do they exist and what are the implications for the workplace? *Journal of Managerial Psychology*, 23(8), 878–890.
<https://doi.org/10.1108/02683940810904376>

X – APPENDIXES

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APPENDIX 1. Interview Transcript Yvonne Schroerswarz

Transcript expert interview Yvonne Schroerswarz (ID:I YS):

3. Mai 2024, 08:25AM



Schmank Jasmin 0:03

Hallo Yvonne danke, dass du dir Zeit nimmst für das Interview mit mir, ich hatte dir ja im Vorfeld schon geschrieben, dass ich zum Thema Interaktion mit Bildschirmen im öffentlichen Raum forsche und dabei habe ich mich insbesondere mit der Motivation von Menschen beschäftigt. Ich würde im Folgenden dir ein paar Fragen stellen und schätze eine maximale Gesprächsdauer von 30 Minuten. Bist du bereit?

Hello Yvonne, thank you for taking the time for the interview with me, I had already written to you in advance that I am researching the topic of interaction with screens in public spaces and I have been particularly concerned with the motivation of people.

I would like to ask you a few questions below and estimate a maximum interview duration of 30 minutes. Are you ready?



Yvonne Schroerswarz 0:30

Ja gerne.

Yes, with pleasure.



Schmank Jasmin 0:32

Perfekt. Also du bist ja Expertin für User und Customer Experience. Meine erste Frage wäre, wodurch Menschen im Umgang mit Technologien motiviert werden, bestimmte Handlungen auszuführen.

Perfect. So you're an expert in user and customer experience. My first question would be what motivates people to perform certain actions when using technology.



Yvonne Schroerschwarz 0:50

Direkt zum Anfang so ne schöne komplexe Frage, die man natürlich gar nicht so einfach beantworten kann gerade aus der User und Customer Experience, denn sowohl bei User Experience als auch bei Customer Experience basiert sehr viel auf den Beobachtungen von Menschen. Das heißt, wir gucken denen eigentlich zu, wie sie mit der jeweiligen Technologie, die wir konzipieren wollen, interagieren, was sie da tun und wo sie da eigentlich über Probleme sozusagen stolpern, also wenn sie keine Ahnung Hundefutter beispielsweise bestellen wollen, beobachten wir wie nutzen Sie diese Webseite?

Was klicken Sie an, wo drüber stolpern sie, welche Annahmen machen Sie, um daraus dann eigentlich abzuleiten, wie wir Sachen optimieren können. Das heißt aber auch gleichzeitig, dass wir dabei berücksichtigen müssen, eigentlich jeder Mensch anders ist und anders funktioniert und aber auch dementsprechend auch durch andere Dinge motiviert werden kann.

Das heißt, wir clustern hinterher eigentlich dann unsere ganzen Beobachtungen von Menschen, die mit unserem Produkt oder mit unserer Seite interagieren, zu sogenannten Personas.

Das heißt, wir erstellen quasi eigentliche Archetypen für verschiedene Nutzergruppen und gucken dann, wenn man bei dem Hundefutter Beispiel bleibt,

es gibt irgendwie die, dessen Hund irgendwie der beste Freund ist, für die anderen ist er wirklich ein total gutes Familienmitglied und für die anderen ist er vielleicht sogar ein kleiner Kind Ersatz und die werden aber durch unterschiedliche Dinge auch motiviert.

Das heißt, es gibt ganz viele verschiedene Faktoren, die eigentlich auf diese Motivation einzahlen können, so dass man das nicht verallgemeinern kann.

It's a really complex question to begin with, and of course it's not so easy to answer, especially from a user and customer experience perspective, because both user experience and customer experience are very much based on observing people.

In other words, we actually watch how they interact with the technology we want to design, what they do and where they stumble across problems, so if they want to order dog food, for example, we observe how they use the website.

What do you click on, where do you stumble over, what assumptions do you make in order to then actually derive how we can optimize things.

However, this also means that we have to take into account the fact that everyone is different and functions differently and can be motivated by different things accordingly.

This means that we then cluster all of our observations of people who interact with our product or our website into so-called personas.

In other words, we create actual archetypes for different user groups and then, if you stick with the dog food example, we look at them,

there are those whose dog is somehow their best friend, for others it is a really good family member and for others it is perhaps even a little child substitute and they are motivated by different things.

In other words, there are lots of different factors that can actually contribute to this motivation, so you can't generalize.



Schmank Jasmin 2:36

Gibt es denn bestimmte Beispiele, die sehr häufig vorkommen, wo man sagen kann, dass viele Menschen motiviert werden, zum Beispiel durch finanzielle Anreize oder den Anreiz, Spaß zu haben oder in einer bestimmten Gruppe Mitglied zu sein?

Are there certain examples that occur very frequently where you can say that many people are motivated, for example by financial incentives or the incentive to have fun or to be a member of a certain group?



Yvonne Schroerswarz 2:52

Ja also, das könnte man aus der psychologischen Sichtweise hättest du da solche Sachen wie die Gamification also das heißt denn Leute irgendwas tun können und dafür belohnt werden keine Ahnung.

Auf einer Webseite durch irgendwelche Badges beispielsweise, also wenn sie irgendwie Level abgeschlossen haben.

Das kennt man auch von klassischen Spielen, dann kriegtste irgendwie ein Abzeichnen dafür aber das gleiche gilt auch wenn du Duolingo bei der

Sprache beispielsweise, wenn du eine Übung abgeschlossen hast, kriegst du hinterher auch beispielsweise Abzeichen.

Aber das geht auch zum Beispiel Treuepunkte sammeln, auch das sind solche Belohnungssysteme, die funktionieren, wo man dann hinterher gegen etwas Reales beispielsweise eintauschen könnte.

Well, from a psychological point of view, you could have things like gamification, which means that people can do something and are rewarded for it, I don't know.

On a website, for example, through badges, i.e. when you have somehow completed a level.

You also know this from classic games and then you somehow get a badge for it, but the same applies if you use Duolingo for the language, for example, if you have completed an exercise, you also get badges afterwards, for example.

But you can also collect loyalty points, for example, which are also reward systems that work, where you can then exchange them for something real, for example.



Schmank Jasmin 3:30

Mhm, okay und gibt es auch Dinge, die vielleicht jetzt nicht so auf der Hand liegen?

Wir zum Beispiel, das Erfahren von Autonomie oder Kompetenz gewinnen, sind diese Themen auch motivierend im Umgang mit Technologie.

Mhm, okay and are there also things that are perhaps not so obvious now?

For example, experiencing autonomy or gaining competence, are these topics also motivating when dealing with technology?

YS

Yvonne Schroerswarz 4:00

Auf jeden Fall, wenn die eigene Selbstwirksamkeit da zum Tragen kommt auf jeden Fall ja.

In any case, if your own self-efficacy comes into play, then yes.



Schmank Jasmin 4:09

Mhm, okay, gut, dann würde ich zur nächsten Frage kommen, und zwar inwieweit aus deiner Erfahrung das Alter der Nutzer und auch der Lebenskontext, also die Lebensumgebung Bildung usw. beeinflussen, wodurch ein Mensch motiviert wird?

Mhm, okay, well, then I would come to the next question, namely to what extent, in your experience, the age of the user and also the life context, i.e. the living environment, education, etc. influence what motivates a person?

YS

Yvonne Schroerswarz 4:35

Ich weiß ich nicht, ob das direkt darauf einzahlt, wie du motiviert wirst ob das nämlich nicht eigentlich eine Charakter Eigenschaft ist von einem also, ob das abhängig von meinem Alter ist, ob ich irgendwie keine Ahnung Schnäppchenjäger bin beispielsweise und eigentlich auf Rabatt und Couponjagd bin sozusagen, ob das altersabhängig oder bildungsabhängig ist glaube ich tatsächlich nicht unbedingt.

Ich glaube aber, dass desto jünger du bist und desto mehr digital native du bist also aufgewachsen bist eigentlich mit der Interaktion mit digitalen Medien, egal ob sie sind wie dein Handy, dein Tablet oder vielleicht auch eben zukünftig im öffentlichen Raum sind, dass du da weniger Hemmungen hast das auszuprobieren.

Und auch, ich glaube Ältere haben vielleicht mehr Angst was falsch zu machen oder so auf irgendwelche falschen Knöpfe zu drücken sozusagen und die Jüngeren ist völlig klar also alles was ich tue, kann ich in der Regel rückgängig machen.

Deswegen ist die Motivation automatisch höher Dinge einfach auszuprobieren.

Mmm.

I don't know whether that has a direct impacts on how you're motivated, whether that's not actually a character trait, whether it's dependent on my age, whether I'm somehow a bargain hunter, for example, and am actually on the hunt for discounts and coupons, so to speak, whether that's dependent on age or education, I don't really think so.

But I believe that the younger you are and the more digital native you are, i.e. the more you've actually grown up interacting with digital media, whether it's your cell phone, your tablet or maybe even in public spaces in the future, the less inhibitions you have about trying it out.

And also, I think older people are perhaps more afraid of doing something wrong or pressing the wrong buttons, so to speak, and the younger ones are completely aware that everything I do can usually be undone.

That's why the motivation to simply try things out is automatically higher.



Schmank Jasmin 5:37

Ja.

Okay, und gibt es aus deiner Erfahrung irgendwelche Wege, wie man Älteren diese Angst nehmen kann?

Oder wie passiert das, dass die Älteren irgendwann auch diese Technologien nutzen?

Yes.

Okay, and from your experience, are there any ways in which older people can overcome this fear?

Or how does it happen that older people also use these technologies at some point?



Yvonne Schroerschwartz 5:55

Auf der einen Seite, wenn man Schemata nutzt, die sie aus anderen Apps beispielsweise kennen also wenn Sie wissen keine Ahnung das Burger Menü ist bei mobile Phone in der Regel oben links.

Dann nutzen sie es dann wissen Sie, da können wir drauf klicken und dann passiert folgendes oder wenn man den Kalender Icon einbindet, das wenn der drauf klickt, dann geht halt der Kalender auf das heißt wenn man Dinge nimmt, die sie schon kennen, das baut automatisch die Hürden ab und wenn man dann dazu Elemente mischt, beispielsweise die sie vielleicht noch nicht kennen dann trauen sie sich auch eher das zu nutzen.

Und Informationen bereitzustellen an den Orten, wo man denkt ah, hier könnte es jetzt vielleicht ein bisschen problematisch werden, hier braucht es

vielleicht ne Erklärung, das ist dann keine Ahnung, man kennt vielleicht von den Info Is die es ab und zu auf Webseiten gibt, wo man draufklicken und dann öffnet sich ein Modul und da werden dann zusätzliche Informationen gegeben.

On the one hand, if you use schemes that you know from other apps, for example, the burger menu is usually at the top left of the mobile phone.

Then they use it then you know, we can click on it and then the following happens or if you integrate the calendar icon, that when they click on it, then the calendar just opens, that is, if you take things that they already know, that automatically reduces the hurdles and if you then mix in elements, for example, that they may not yet know, then they are more likely to dare to use it.

And to provide information in those places where you think ah, this might be a bit problematic, this might need an explanation, I don't know, you might be familiar with the Info Is that are available on websites from time to time, where you click on them and then a module opens and additional information is provided.



Schmank Jasmin 6:42

Okay super, dann könnten wir auch schon zur nächsten Frage kommen, und zwar gucken wir jetzt mehr auf die Bildschirme im öffentlichen Raum und die Frage, inwieweit du dir vorstellen kannst, dass solche Bildschirme mithilfe von interaktiven Anwendungen, bestimmte Bedürfnisse oder Belohnungssysteme, über die wir gesprochen haben, erfüllen können.

Okay great, then we could move on to the next question, and we're now looking more at screens in public spaces and the question of the extent to which you

can imagine that such screens can fulfill certain needs or reward systems that we've talked about with the help of interactive applications.

YS

Yvonne Schroerswarz 7:18

Ja, also da denke ich.

Wenn ich damit interagiere und etwas dafür bekomme, also ich Mehrwert davon rausziehen kann, würde ich das tun beispielsweise. Wenn ich als Beispiel Bereitstellung von einem exklusiven Zugang zu etwas, das heißt, ich habe vielleicht damit angefangen, irgendwie. Ich stelle mir jetzt vor ich sitze an der Bushaltestelle und da steht halt so ein so ein Bildschirm und auf einmal fordert der mich dazu auf Hey lern doch mit mir irgendwie eine neue Sprache oder so und dann fange ich damit an und dann mach ich das, der Bus kommt und ich krieg aber dann hey, du hast das gemacht, hier ist ein Gutschein Code, den du für irgendwie ne andere App oder irgendwie für eine Sprachschule oder sonst irgendwas eintauschen kannst und das halt die Zeit überbrückt wird, wie ich im öffentlichen Raum durch Warten oder durch Nichtstun sozusagen eigentlich auffülle.

Yes, that's where I think.

If I interact with it and get something in return, so I can get added value out of it, I would do that, for example. If, as an example, I provide exclusive access to something, that is, I may have started with it somehow.

I imagine I'm sitting at the bus stop and there's a screen like this and suddenly I can, it asks me to Hey, learn a new language with me or something and then I start and then I do that, the bus comes and then I get hey, you've done this, here's a voucher code that you can exchange for another app or for a language school or

something else and that just bridges the time that I'm actually filling up in public space by waiting or doing nothing, so to speak.



Schmank Jasmin 8:15

Mhm okay und könntest du dir vorstellen, dass Menschen sowas aber auch außerhalb von Wartezeiten nutzen, also in Räumen, in denen sie normalerweise sich bewegen, wie jetzt zum Beispiel bei einem Parkspaziergang stehen bleiben würden aktiv, um in so einer Interaktion mit einem Bildschirm zu treten?

Mhm, okay, and could you imagine that people would use something like this outside of waiting times, in places where they normally move around, such as stopping during a walk in the park, to actively engage with a screen in such an interaction?



Yvonne Schroerswarz 8:36

Wenn Sie das Bedürfnis erfüllen, dass ich gerade habe, also wenn sie mir meinen Mehrwert bieten, also wenn Sie keine Ahnung, wenn ich Schnäppchenjäger bin

und die bieten mir durch irgendeine Interaktion als Goodie dann sozusagen meinen Rabattcoupon oder einen Treuepunkte oder sonst irgendwas an, dann glaube ich schon, dass das funktioniert oder wenn ich dadurch irgendwelche personalisierten Empfehlungen dann hinterher bekomme, dann kann ich mir schon vorstellen, dass man da stehen bleibt damit interagiert oder aber wenn es mir Mehrwert zum öffentlichen Raum gibt, also wenn ich darüber beispielsweise in diesen Parkinformationen zu den Bäumen und zu den Gräsern und zu den Blumen, die in diesem Park sind geben, dann kann ich mir auf jeden Fall auch vorstellen.

If they fulfill a need that I currently have, meaning if they offer me added value, like if I'm a bargain hunter and through some interaction they offer me a discount coupon or loyalty points or something like that, then I believe it could work. Or if I receive personalized recommendations as a result, I can definitely imagine stopping to interact with it. Additionally, if it provides value to the public space, such as offering information about the trees, grasses, and flowers in the park, I can certainly see myself engaging with it.



Schmank Jasmin 9:22

Mhm, ja, spannende Ideen. Ok, dann schauen wir mal auf den Bereich der Hürden also die Frage wäre, was du denkst, was Barrieren sein könnten, die die Motivation wiederum beeinträchtigen, mit solchen Bildschirmen zu interagieren.

Mhm, yes, interesting ideas. Okay, let's look at the area of barriers. So, the question would be, what do you think could be the obstacles that might affect the motivation to interact with such screens?



Yvonne Schroerswarz 9:44

Mir muss direkt im ersten Moment also wenn es meine eigentliche Handlung ich gehe im Park spazieren, mit meinem Hund zum Beispiel dann denkt man ja meistens relativ wenig oder ich zumindest. Das heißt das Ding also dieser öffentlichen Bildschirm muss dann meine Aufmerksamkeit sehr klar auf sich ziehen und das unterbrechen können und mir muss der Mehrwert, dass ich stehen bleiben und damit interagiere sofort in der ersten Sekunde quasi klar werden, dass herzustellen ist, glaube ich eine große Herausforderung und das muss ja auch für die unterschiedlichen

Personengruppen, die unterschiedlich durch unterschiedliche Dinge motiviert werden, ja.

In the first moment, if it interrupts my original action—like walking in the park with my dog, for example—I usually don't think much, or at least I don't. That means this public screen must clearly grab my attention and interrupt my activity effectively. The added value of stopping and interacting with it must be immediately apparent within the first second. Achieving this is a significant challenge, and it must also cater to different groups of people who are motivated by different things.



Schmank Jasmin 10:24

Mhm, okay, Mhm, dann kommen wir zur letzten Frage, und zwar gibt es Motivatoren, die eher langfristig funktionieren beziehungsweise auch andersrum Motivationssteigerungen die eher kurzfristig funktionieren, also zum Beispiel monetäre oder eben Autonomie, Kompetenz gewinnen, gibt es da Unterschiede, dass man sagt, Okay, aus der Erfahrung lässt das eine eher nach mit der Zeit und ein anderer Motivator funktioniert längerfristig?

Mhm, okay. So, let's move on to the last question. Are there motivators that work more in the long term, and conversely, are there motivators that work more in the short term? For example, monetary incentives versus gaining autonomy or competence. Are there differences in that one type tends to fade over time while another works longer term based on experience?



Yvonne Schroerswarz 11:02

Also monetär ist ja in der Regel so, dass es meistens irgendeine gewisse Schwelle gibt über die hinaus, weil nicht mehr durch Geld motiviert werden kann.

Die ist glaub ich, immer wieder individuell zwar bei den Leuten, aber irgendwann ist das glaub ich ausgereizt.

Äh, Kompetenzgewinn ist finde ich auch eine sehr individuelle Sache, also je nachdem möchte ich eine Expertin etwa sein oder reicht mir ein Basiswissen eigentlich von etwas aus?

Aber je nachdem, wo diese Kompetenz Schwelle, dann für jemanden ist, glaube ich, dass es schon ein hoher Motivator sein könnte, da zusätzliche Informationen zu bekommen.

Ich glaube, das Abwechslung auch durchaus ein hoher Motivator sein kann. Also, desto mehr Abwechslung hier angeboten wird und mir nicht langweilig wird bei dem, vielleicht habe ich auch dann einmal einen monetären Gewinn, beim nächsten Mal hab ich irgendwie einen Kompetenz Gewinn, so das meine ich mit abwechseln.

Monetary incentives typically have a certain threshold beyond which people are no longer motivated by money. This threshold varies individually, but eventually, it tends to be exhausted.

Gaining competence is also very individual. Some people might want to become experts in something, while others are satisfied with just a basic understanding. Depending on where that competence threshold lies for someone, gaining additional information could be a strong motivator.

I also believe that variety can be a significant motivator. The more variety is offered, and the less bored I become, the more motivated I might be. For instance, one time I might receive a monetary reward, and the next time I might gain new knowledge or skills. This is what I mean by variety.



Schmank Jasmin 12:03

Okay ja.

Okay yes.



Yvonne Schroerschwarz 12:06

Und auch schön und dann freut man sich vielleicht aber auch tatsächlich dann darauf dahin zu gehen, weil man gar nicht weiß was erwartet mich denn heute habe ich heute wieder die Chance, irgendwie ein bisschen Geld zu machen damit oder lerne ich heute vielleicht irgendwas oder steigert das heute meinen Selbstwert, kann auch sein.

And that can be great because it might actually make people look forward to going there, not knowing what to expect. Today, I might have the chance to earn some money, or maybe I'll learn something new, or perhaps it will boost my self-esteem.



Schmank Jasmin 12:10

Mhm also ist es dann quasi die Überraschung, die einen dann zusätzlich motiviert, dort aktiv hinzugehen?

Mhm, so it's the element of surprise that additionally motivates people to go there actively?

YS

Yvonne Schroerswarz 12:32

Genau genau so, dass man dann nämlich auf einmal anfängt, von sich aus freiwillig dahin zu gehen.

Das heißt, man muss gar nicht mehr unterbrochen werden, sondern man denkt sie auch kommen wir gucken mal was ist heute wieder Neues gibt?

Exactly, exactly. This means that people might start going there voluntarily on their own. They wouldn't need to be interrupted; instead, they'd think, "Let's see what's new today."



Schmank Jasmin 12:42

Mhm war spannend, ja, okay, das wäre jetzt auch meine letzte Frage gewesen.

Ansonsten bleibt nur noch die Frage, ob du noch weitere Anmerkungen hast zu dem Thema, zu meiner Forschung oder zu den Fragen, die wir besprochen haben.

Mhm, that was interesting, yeah, okay, that would have been my last question now. Otherwise, the only question left is whether you have any further comments on the topic, on my research, or on the questions we discussed

YS

Yvonne Schroerswarz 12:58

Ne, aber ich finde das ist ein sehr spannendes Forschungsthema, was du dir ausgesucht hast und ich bin sehr gespannt auf deine Doktorarbeit hinterher.

No, but I think that's a very interesting research topic you've chosen, and I'm very curious about your doctoral thesis afterwards.



Schmank Jasmin 13:04

Dankeschön ja, dann bedanke ich mich auch ganz herzlich für deinen Beitrag.

Zu guter Letzt würde ich dich noch gerne fragen, ob du die transkribierte Version von unserem Interview gerne zugeschickt bekommen möchtest.

Thank you very much. Finally, I would like to ask if you would like to receive the transcribed version of our interview.



Yvonne Schroerswarz 13:20

Nein.

No.



Schmank Jasmin 13:20

Nein, ok möchtest du, dass ich dich darüber informieren, sobald meine Promotionsarbeit veröffentlicht wurde?

No, ok would you like me to inform you as soon as my doctoral thesis has been published?



Yvonne Schroerswarz 13:28

Ja.

Yes.



Schmank Jasmin 13:29

Dann mache ich das sehr gerne, dann würde ich jetzt die Aufnahme beenden.

Genau ich bedanke mich nochmal, ich wünsche dir alles gute und beende jetzt erstmal die Aufzeichnung.

Then I'd be very happy to do that, then I'd end the recording now.

Exactly, thank you again, I wish you all the best and I'll finish the recording now.



Yvonne Schroerswarz 13:45

Alles klar, danke dir.

All right, thank you.

APPENDIX 2. Interview Transcript Christian von den Brincken**Transcript expert interview Christian von den Brincken (ID:I CB):**

21. Juni 2024, 08:05AM



Schmank Jasmin 0:07

Hallo Christian, Dankeschön für deine Zeit. Ich hatte dir im Vorhinein gesagt, dass ich zu interaktiven Bildschirmen im öffentlichen Raum forsche und würde dir gerne im Rahmen des Interviews einige Fragen stellen. Wenn du bereit bist, würde ich anfangen.

Hello Christian, thank you for your time. I told you in advance that I am researching interactive screens in public spaces and would like to ask you a few questions during the interview. If you're ready, I'd like to start.



von den Brincken Christian 0:23

Ja.

Yes.



Schmank Jasmin 0:25

Okay, die erste Frage lautet welche Erfolgsfaktoren gibt es bei der Anwendung von Bildschirm im öffentlichen Raum deiner Erfahrung nach?

Okay, the first question is what are the success factors for using screens in public spaces in your experience?



von den Brincken Christian 0:35

Also grundsätzlich ist der Erfolgsfaktor bei Anwendung von Bildschirmen im öffentlichen Raum Aufmerksamkeit, ja so, du versuchst erstmal Aufmerksamkeit zu erzielen.

Das ist die Währung, in der unserer Branche funktioniert, und das ist die Währung, die wir bei Ströer verkaufen.

Wenn du jetzt diese Bildschirme interaktiv machst, dann fängst du damit automatisch an mehr anzubieten, nämlich das, was du bei einer online Interaktion auch anbieten würdest, nämlich über die Aufmerksamkeit hinausgehend eine Qualifizierung der Aufmerksamkeit.

Wie lange ist die oder wie intensiv bis hin, wenn es eine Interaktion gibt dazu, wird die Interaktion angenommen?

Also was im online ein Klick wäre, das wäre ja in dem Fall beispielsweise das Scannen eines QR Codes oder das Öffnen einer Applikation oder was auch immer und das kannst du dann weiter qualifizieren. Kommt es zu einer Kaufbereitschaft, kommt es vielleicht sogar zu einem Warenkorb oder zu einem Kaufinteresse?

Kommt es möglicherweise sogar dazu, dass der Warenkorb auch abgeschickt wird?

Wird der auch bezahlt? Wird die Ware dann auch aufbewahrt? Wird das möglicherweise wieder gekauft?

Wird es weiter empfohlen, also quasi der gesamte digitale Marketing Funnel?

Dann würdest du auf die Bildschirme dann transponieren und hast den einzigartigen Vorteil, dass eigentlich kein anderes Medium, so viel Reichweite liefern kann wie ein Bildschirm im öffentlichen Raum, das heißt, warum solltest du das überhaupt machen, weil du Reichweite kriegst und Zielgruppen, die du über andere Kanäle nicht mehr zusätzlich kriegst

kannst.

Die hast du bereits ausgeschöpft.

Deswegen ist es grundsätzlich so, dass wir immer wieder feststellen das Agenturen und Kunden derartige Konzepte, ich sag mal bedenken ja oder sich wünschen würden in einer idealen Welt?

So basically, the success factor when using screens in public spaces is attention, yes, you try to get attention first.

That's the currency in which our industry works, and that's the currency we sell at Ströer. If you now make these screens interactive, then you automatically start to offer more, namely what you would also offer in an online interaction, namely a qualification of the attention beyond the attention.

How long or how intensive is it until, if there is an interaction, is the interaction accepted?

So what would be a click online in this case would be, for example, scanning a QR code or opening an application or whatever, and you can then qualify this further. Does it lead to a willingness to buy, does it perhaps even lead to a shopping cart or an interest in buying? Does the shopping cart possibly even get sent? Is it also paid for? Will the goods be kept? Will it possibly be bought again? Is it recommended to others, i.e. the entire digital marketing funnel?

Then you would then transpose to the screens and have the unique advantage that no other medium can actually deliver as much reach as a screen in a public space, i.e. why should you do it at all, because you get reach and target groups that you can no longer get through other channels.

You've already exhausted them.

That's why we always find that agencies and clients would consider such concepts, or would want them in an ideal world?



Schmank Jasmin 2:43

Ok Ströer hat ja auch schon zahlreiche interaktive Kampagnen durchgeführt mit Kunden. Was ist denn eure Erkenntnis?

Wann das besonders gut angenommen wird, wird das generell gut angenommen?

Was sind da so die Leitplanken, auf die man achten muss?

Ok, Ströer has already carried out numerous interactive campaigns with customers. What are your findings? When is it particularly well accepted, is it generally well accepted? What are the guidelines that you have to pay attention to?



von den Brincken Christian 3:04

Ja, wir machen ja keine Kampagnen, wir schalten die nur, also bei uns kann man die platzieren. Wir kontrollieren ob die juristisch ohne Beanstandungen sind und nicht gegen geltendes Recht verstoßen und wenn sie das nicht tun, dann kann ein Kunde mehr oder weniger machen, was er möchte, sofern er die Grenzen unserer technischen Möglichkeiten nicht überreizen möchte. Das heißt also für die Kampagne ist der Kunde verantwortlich. Warum erzähle ich das, weil das eben auch der Schlüssel zum Erfolg ist, also das heißt, nicht die Technologie ist das, was angenommen wird, sondern die Experience also der Mehrwert, der kann entweder in etwas Realem bestehen, ich krieg einen Coupon, für den kriege ich irgendeine Leistung oder irgendeinen Gegenstand billiger oder umsonst oder auch eine Exklusivität oder es kann etwas sein, was einfach unheimlich gut gemacht ist, was mich gut unterhält, oder mehr Informationen gibt, die ich sonst nicht habe wie jetzt zum Beispiel der Toralarm der Telekom, wo alle Tore, nachdem sie gefallen sind, live auf den Screens gezeigt werden. Das ist nicht interaktiv, aber es könnte mich dazu bringen zu gucken, wie

die App heißt, in der ich das kriegen kann. Ja also das heißt, wir haben darauf keinen Einfluss, wir gehen auch nicht hin und sagen hör mal deine Kreation ist doof oder so, wenn wir gefragt werden, dann versuchen wir da Unterstützung zu leisten und weisen immer wieder auf bestimmte Regeln und so weiter hin.

Aber wir sind für die Kreation nicht verantwortlich. Wir versuchen natürlich immer wieder den Nutzwert unseres Angebotes über reinen Broadcast, also reine Bildkommunikation hinaus zu erweitern und damit auch an neue Budgets zu kommen und haben deswegen eine große Offenheit, wenn immer Kunden Kampagnen implementieren möchten, die eine gewisse Interaktivität haben, so in dem Zusammenhang haben wir vor mittlerweile 12 Jahren, da gab es noch keine iPhones, da waren viele noch gar nicht geboren, hätte ich fast gesagt, also vor 12 Jahren haben wir eine App entwickelt die hieß damals Virtual out of home, die quasi mit Bilderkennung funktioniert hat. Du konntest dein Handy auf etwas draufhalten und bekamst dann eine Augmented Reality Interaktion, also einfaches Beispiel du hältst dein Handy auf eine Litfaßsäule auf der für einen Kinofilm geworben wird und dann kommt der Schauspieler dir Entgegengelaufen und macht vor dir ein Tänzchen ja, heute ist das nicht mehr so freaky.

Damals war das spektakulär neu, hat keiner benutzt, ja, dann haben wir im Jahr ich glaub, ich weiß gar nicht mehr wann war das so? Vor Corona? Nein, also 2014/15 an 70.000 Werbeträgern von uns iBeacons verbaut, war damals spektakulär neu ne, kleine Bluetooth Sender, die mit deinem Handy Kontakt aufgenommen haben und dem ein Signal eingespielt haben, wenn man das wollte, beispielsweise beim Betreten eines Bahnhofs bekommst du Informationen über die Wegführung. Wo sind die Treppen, wo sind die Toiletten oder auch beispielsweise Gutscheine für die Gastronomie oder

solche Geschichten.

Hat auch nicht besonders gut geklappt und QR Code gibt es so lange, wie es Plakate gibt. Seit langer, langer Zeit, und die Geschichte von nicht funktionierenden Kampagnen mit miserablen Response Quoten ist leider endlos lang.

Das ändert sich jetzt langsam so ein bisschen interessanterweise, weil durch Corona hat jeder irgendwie gelernt, mit QR Codes umzugehen. Weil man da ja ein Impfzertifikat hatte und deswegen hat sich die dahinterliegende Mechanik Snapping, also ich benutze mein Handy um etwas zu scannen und dann geht die Interaktion auf meinem privaten Display weiter, das hat sich ganz gut durchgesetzt. Wir haben auch, das war übrigens mein erstes Projekt bei Ströer vor 13 Jahren, damals eine AR Anwendung gemacht, das heißt den Bildschirm komplett interaktiv gemacht.

Du konntest also vor dem Bildschirm Produkte anziehen, ja, also da war ein Avatar von dir, der hat Schuhe angezogen, Goertz virtual Shoe Fitting und Ikea hat sowas auch mal gemacht, da kannst du quasi in einem Regal die Schränke aufmachen und gucken, wieviel Platz da drin war vor dem Werbeträger. Also über Kinect Erkennung hat das damals funktioniert und je nachdem wie du dich bewegt hast durch Gestik konntest du den Werbeträger steuern.

Es gab auch so eine Virtual Slot Maschine, da konntest du also einfach „so“ machen vor dem Bildschirm und dann lief so eine Slot Machine und wenn dann dreimal Joker war, dann bekamst du einen Code, den du auf dem Handy aktivieren, da hast du einen Gutschein bekommen. So also das heißt, wir haben schon relativ viel gemacht, und interessanterweise funktioniert sowas bei uns im Ausland ziemlich gut.

Ja, es gibt viele Erfolgscases aus Asien, aber in Deutschland nicht. In Deutschland kannst du es einfach vergessen ja, platt gesagt würde ich sagen

die Responsequoten, die solche Kampagnen haben, sind unterirdisch und absolut unter aller Kanone und deswegen wird sowas auch nie wiederholt. Es gibt eine Ausnahme, wir hatten mal einen Case mit Niantic, die haben virtuelle Codes integriert in Pokémon go, das heißt, du könntest also an unseren Werbeträgern in Pokémon Go Schätze finden, eine Art Schnitzeljagd, die du nur gesehen hast, wenn du diese App hattest, ja durch die App und das war sehr gut.

Das haben die allerdings gemacht mit beim Profispieler Event, die haben also die hundert oder 1000 besten Pokémon Go Spieler der Welt eingeladen nach München und mit denen so eine Schnitzeljagd gemacht. Das ist halt eine sehr spitze Zielgruppe, ja von Leuten, die ohnehin eine hohe Affinität haben und es gab einen enormen Mehrwert, die haben halt ganz seltene digitale Gegenstände finden können.

Das hat gut funktioniert, aber wie gesagt in einer sehr spitzen Methodik ja, das heißt also im Grunde genommen ist vielleicht mal ein Hinweis, was wir jetzt feststellen.

Damit beantworte ich auch schon die anderen Fragen von dir gerade, aber die kannst du ja im Nachhinein einflechten ja, ist dass diese QR Codes eine gewisse Renaissance erleben, weil ja die EAN Codes abgeschafft werden.

In 2026 wird per EU-Verordnung werden die Barcode von Produkten ersetzt, durch sogenannte XQR Codes und diese XQR Codes funktionieren mit sehr unterschiedlichen Mustern. Das heißt, es muss nicht mehr so eine hässliche Pixelwolke sein, sondern das kann sehr realistisch, fast wie ein Bild aussehen und dadurch kann man sehr viele Informationsschichten da reinlegen.

Es funktioniert also ähnlich wie ein Cookie, das heißt, wenn jemand das scannt, dann weiß ich, wer das ist, wo der ist, was der vorher gekauft hat,

wie der Warenkorb aussieht und so weiter.

Der Handel kriegt dadurch ganz andere Verkaufsinformation und die kannst du auch Marketingmäßig nutzen, also wir glauben schon, dass es da eine Renaissance gibt für diese XQR Code, das merken wir jetzt auch. Aktuell gibt es immer mehr Kampagnen, die damit arbeiten und das verwenden.

Das hat nicht mehr diesen speziellen free Charakter. Du brauchst da auch keine App mehr, das ist die größte Barriere, ja das funktioniert nativ mit deiner Kamera App, die erkennt das ist ein QR Code und geht direkt in die Interaktion und das was eben nicht funktioniert ist halt ja, wenn du glaubst du könntest den Leuten irgendeine App unterjubeln das kannst du vergessen.

Das macht kein Mensch, es sei denn du kriegst einen wahnsinnig faszinierenden Mehrwert also du kriegst in der Regel kaum eine App verbreitet und du musst unheimlich vorsichtig sein, was Datenschutz betrifft.

Ja, deswegen funktionieren die ganzen Sensorik Geschichten und all die ganzen Sachen am Display auch nicht, weil du würdest ja nicht an einem öffentlichen Display am Bahnhof, wo in einer Stunde Tausende Leute vorbeikommen, ein neues Kleid anprobieren was meinst du, was du dir für dumme Sprüche anfängst, von irgendwelchen Idioten, das wird es ja nicht machen.

Du machst das in deinem privat Display, du benutzt also den großen Display höchstens um das private Display zu aktivieren. Ja, und zur Frage wie funktioniert das und was sind die Erfolgsfaktoren? Und das was du am Anfang gesagt hattest na ja, da gibt es eine Best of Class, nennt sich tiktok ja, wer einfach ungeschlagen ist da drin ist tiktok, die schaffen das, dass die halbe Welt ein Großteil ihrer Zeit damit verbringt.

Dumme, langweilige, kurze Videos zu gucken von irgendeinem Quatsch, aber der Algorithmus, der genau erkennt, was dich persönlich kickt, ist so gut ja, das ist die Menschen dazu bringt auf dem Klo zu sitzen und tiktok zu benutzen.

Stundenlang ja und die Kinder alle völlig verrückt sind.

Ich habs mir deinstalliert, weil ich auch gemerkt hab, dass es mich auch süchtig gemacht hat, aber ich bin ein alter Mann. Also das heißt, wenn du jetzt sagst oh wir sind Außenwerbeanbieter und wir müssen da besonders coolen Content machen, der die Leute dazu bringt vor diesem Schirm zu verweilen.

Dann gibt es eine Copy Cat, eine best in Class, das ist tiktok. Schlag maltiktok, Chance 0, kannst du natürlich vergessen ja, du hast die Daten nicht, du hast die Rechenkapazität nicht, du hast das Know how nicht, du hast nichts ne, tiktok versucht unsere Screens zu kriegen, um ihren Content da drauf zu knallen, weil sie noch mehr Leute süchtig machen wollen, machen wir nicht mit.

Das es gibt eine Reihe von Gründen, warum wir unsere öffentlichen Werbenetzwerke nicht für tiktok bereitstellen werden, jedenfalls nicht für Inhalte, sondern nur wenn dann können die eine Werbekampagne bei uns buchen, aber die wird halt sehr teuer, aber keinen Content. Aber das ist eigentlich das, wie es geht leider, also die haben rausgefunden wie es funktioniert, also das heißt die Potentiale, es gibt noch einen wichtigen Hinweis vielleicht im Zusammenhang mit Engagement für öffentliche Bildschirme.

Das Wirkprinzip der Außenwerbung ist, dass ich mit einer Ausspielung auf einer Hardware enorm viele Kontakte erreiche. One to many, das Problem bei Fernsehen.

Deswegen ist auch die Umweltbilanz von Fernsehen sehr schlecht. Schlecht ist One to One.

Jeder Mensch, der Fernsehen guckt, braucht ein Fernsehgerät und das wiederum braucht Energie, braucht Ressourcen zur Herstellung, hat Lieferketten und ist eine hohe Komplexität. Während bei der Außenwerbung, wenn wir so einen Bildschirm irgendwo hinbauen, dann hält der erstmal 6 Jahren und am Tag laufen da an den Spitzenstandorten bis zu 500000 Leute vorbei, kannst du hochrechnen 365 Tage mal 6 Jahre mal 500000 das sind eine Menge Fernseher, die eine Menge Ressourcen kosten. Also mit einer Ausspielung erreicht ganz viele, das ist ein bisschen flüchtiger als wenn jemand vom Fernsehen sitzt okay ne, aber eben halt wahnsinnig viele one to many.

Interaktion killt dieses Wirkprinzip. Bei Interaktion sage ich, mach jetzt was Tolles für die Jasmin Schmank, der biete ich irgendwie neues Shampoo an, was die ganz geil findet und das kann sie jetzt interaktiv ausprobieren und sieht wie ihre Haare dann fallen, aber all die Menschen um dich herum, ja sind in im Grunde genommen desinteressiert, aber es ist ja eine persönliche Geschichte.

Ich würde also nie in öffentlichen Bildschirm dazu nutzen, ich würde immer nur einen privaten nutzen, deswegen sind wir als Ströer hinter solchen Geschichten nicht so her. Weil die Preise, die für Kunden dann entstehen, sind exorbitant hoch.

Ja, also vor 10 Jahren haben Kunden uns alle damit genervt. Wir wollen was interaktives machen, da haben wir gesagt, gut wisst ihr was?

Wir werden dafür unsere Werbenetzwerk nicht zerreißen, was wir aber machen ist, wir bauen 50 Bildschirme, die quasi transportabel sind und volle Interaktionsfähigkeit, die könnt ihr dann mieten. Hat, nie je einer gemietet,

war ein Riesenflop ja, weil auch dann in Deutschland der Aufwand hoch ist, du darfst da nicht einfach im öffentlichen Raum eine Kamera installieren.

Du musst dann ein Eventteam haben, was alle Menschen, die darum herum stehen, fragen, ob sie bereit sind, dass sie hier möglicherweise aufgenommen werden.

Das kannst du vergessen und am Ende ist der TKP, also der tausender Kontaktpreis so exorbitant hoch, dass der Kunde sagt, pass mal auf, um der Frau Schmank, jetzt neue Zahnpasta zu verkaufen gebe ich nicht 1000€ aus, sondern an so einer Tube verdiene ich 0,03€, also ist die Frau Schmank mir vielleicht, ja customer acquisition cost wenn das eine Wiederkäuferin ist vielleicht 0,50€ wert, also das ist der TKP den Kauf ich im TV einen Broadcast oder wenn ich einen guten Preis krieg bei Ströer, also diese ganze Idee mit wir machen Bildschirme interaktiv ist leider Kappes.

Yes, we don't run campaigns, we just publish them, so you can publish them with us. We check whether they are legally unobjectionable and do not violate current law, and if they do not, then a customer can do more or less what they want, as long as they do not want to overstretch the limits of our technical possibilities. In other words, the customer is responsible for the campaign.

Why am I telling you this, because this is also the key to success, i.e. it is not the technology that is accepted, but the experience, i.e. the added value, which can either consist of something real, I get a coupon, for which I get some service or some object cheaper or for free or even an exclusivity or it can be something that is simply incredibly well done, that entertains me well, or gives me more information that I would otherwise not have, such as Telekom's goal alarm, where all goals are shown live on the screens after they have been scored.

It's not interactive, but it could make me look up the name of the app where I can get it. So that means we have no influence on it, we don't go and say your creation is stupid or anything like that, if we are asked, then we try to provide support and always point out certain rules and so on.

But we are not responsible for the creation. Of course, we are always trying to expand the utility value of our offering beyond pure broadcast, i.e. pure image communication, and thus also to get new budgets and therefore have a great openness whenever customers want to implement campaigns that have a certain interactivity, so in this context we developed an app 12 years ago, when there were no iPhones yet, when many were not even born, I would almost have said, so 12 years ago we developed an app called Virtual out of home, which worked with image recognition, so to speak. You could hold your cell phone up to something and then get an augmented reality interaction, for example, you hold your cell phone up to an advertising pillar advertising a movie and then the actor comes running towards you and does a little dance in front of you, yes, today that's not so freaky anymore.

Back then it was spectacularly new, nobody used it, yes, then we did it in the year I think, I don't even remember when it was? Before Corona?

No, in 2014/15 we installed iBeacons on 70,000 of our advertising media, which was spectacularly new at the time - small Bluetooth transmitters that made contact with your cell phone and sent a signal to it if you wanted it, for example when you entered a train station, you received information about the route. Where are the stairs, where are the toilets or, for example, vouchers for restaurants or stories like that.

It didn't work particularly well and QR codes have been around for as long as there have been posters. For a long, long time, and the history of campaigns that didn't work with miserable response rates is unfortunately endless.

This is now slowly changing a bit, interestingly enough, because the coronavirus has somehow taught everyone how to use QR codes.

Because you had a vaccination certificate and that's why the underlying mechanics of snapping, i.e. I use my cell phone to scan something and then the interaction continues on my private display, has become quite popular. We also made an AR application, which was my first project at Ströer 13 years ago, by the way, meaning we made the screen completely interactive.

So you could put on products in front of the screen, yes, there was an avatar of you putting on shoes, Goertz virtual shoe fitting and Ikea also did something like that once, where you could virtually open the cupboards on a shelf and see how much space there was in front of the advertising medium. Back then, it worked via Kinect recognition and depending on how you moved through gestures, you could control the advertising medium.

There was also a virtual slot machine, so you could just do it "like this" in front of the screen and then a slot machine would run and if there were three jokers, you'd get a code that you could activate on your cell phone and you'd get a voucher. So that means we've already done quite a lot, and interestingly enough, it works quite well for us abroad.

Yes, there are many successful cases from Asia, but not in Germany. In Germany, you can simply forget about it - to put it bluntly, I would say that the response rates for such campaigns are subterranean and absolutely sub-par, which is why they are never repeated.

There is one exception, we once had a case with Niantic, they integrated virtual codes into Pokémon go, which means you could find treasures on our advertising media in Pokémon Go, a kind of scavenger hunt that you only saw if you had this app, yes through the app, and that was very good.

But they did that with the professional player event, so they invited the hundred or thousand best Pokémon Go players in the world to Munich and did a scavenger hunt with them.

That's a very high-end target group, yes, of people who already have a high affinity and there was enormous added value, they were able to find very rare digital items. That worked well, but as I said, it was a very sophisticated methodology, so basically that's perhaps an indication of what we're seeing now.

This also answers the other questions you just asked, but you can add them afterwards, is that these QR codes are experiencing a certain renaissance because EAN codes are being abolished.

In 2026, the EU regulation will replace product barcodes with so-called XQR codes, and these XQR codes work with very different patterns. This means that it no longer has to be such an ugly cloud of pixels, but can look very realistic, almost like a picture, and so you can put a lot of layers of information in there.

It works in a similar way to a cookie, which means that when someone scans it, I know who they are, where they are, what they bought before, what their shopping cart looks like, etc.

It gives retailers completely different sales information and you can also use it for marketing, so we believe that there is a renaissance for this XQR code, and we are noticing that now.

There are currently more and more campaigns that work with it and use it.

It no longer has this special free character.

You don't need an app anymore, that's the biggest barrier, yes it works natively with your camera app, it recognizes it's a QR code and goes straight into

the interaction and the thing that doesn't work is, if you think you can foist some app on people, you can forget it.

Nobody does that, unless you get an insanely fascinating added value, i.e. you generally hardly get an app distributed and you have to be incredibly careful when it comes to data protection. Yes, that's why all the sensor stories and all the things on the display don't work, because you wouldn't try on a new dress on a public display at the station, where thousands of people pass by in an hour, what do you think, what stupid comments you'll get from some idiots, it won't do that.

You do this in your private display, so you only use the large display to activate the private display. Yes, and how does that work and what are the success factors? And what you said at the beginning, well, there is a best of class, it's called tiktok, who is simply unbeaten in there is tiktok, they manage to get half the world to spend a large part of their time with it.

Watching stupid, boring, short videos of some nonsense, but the algorithm that recognizes exactly what kicks you personally is so good yes, that it makes people sit on the toilet and use tiktok for hours yes and the kids are all completely mad. I uninstalled it because I realized that I was addicted to it too, but I'm an old man. So that means if you say oh, we're an outdoor advertising provider and we have to make particularly cool content that makes people linger in front of this screen.

Then there's a copy cat, a best in class, that's tiktok. Beat maltiktok, chance 0, of course you can forget it, you don't have the data, you don't have the computing capacity, you don't have the know-how, you don't have anything, tiktok is trying to get our screens to put their content on them because they want to get even more people hooked, we're not going along with that.

There are a number of reasons why we won't make our public advertising networks available to tiktok, at least not for content, but only if they can book an advertising campaign with us, but that will be very expensive, but no content. But that's actually how it works, unfortunately, so they have found out how it works, i.e. the potential, there is perhaps another important point in connection with engagement for public screens.

The working principle of outdoor advertising is that I can reach an enormous number of contacts with one playout on one piece of hardware. One to many is the problem with television. That's why the environmental balance of television is very poor. One to one is bad.

Every person who watches television needs a television set, which in turn needs energy, requires resources for production, has supply chains and is highly complex. Whereas with outdoor advertising, if we install a screen like this somewhere, it will last for 6 years and up to 500,000 people walk past it every day at the top locations, you can extrapolate 365 days times 6 years times 500,000 - that's a lot of televisions that cost a lot of resources. So with one playout you reach a lot of people, it's a bit more fleeting than when someone is sitting in front of the TV, okay, but it's just an incredible number of one to many.

Interaction kills this principle. With interaction, I say, do something great for Jasmin Schmank, I'll offer her some new shampoo that she really likes and she can try it out interactively and see how her hair falls, but all the people around you are basically uninterested, but it's a personal story.

So I would never use a public screen for this, I would only ever use a private one, which is why we as Ströer are not so keen on such stories. Because the prices that customers then have to pay are exorbitantly high.

Yes, 10 years ago customers were annoying us all with that. We wanted to do something interactive, so we said, well, you know what?

We're not going to tear up our advertising network, but what we are going to do is build 50 screens that are virtually transportable and fully interactive, which you can then rent. No one has ever rented them, it was a huge flop, because the effort involved in Germany is also high, you can't just install a camera in a public space. You then have to have an event team that asks all the people standing around it whether they are willing to possibly be recorded here.

You can forget that and in the end the CPM, i.e. the thousand contact price, is so exorbitantly high that the customer says, watch out, in order to sell Mrs. Schmank new toothpaste now, I don't spend €1000, but I earn €0.03 on a tube like that, so maybe Mrs. Schmank is worth €0.50 to me, yes, customer acquisition cost if she's a repeat buyer is maybe worth €0.50, so that's the CPM I buy on TV a broadcast or if I get a good price at Ströer, so this whole idea of making screens interactive is unfortunately garbage.



Schmank Jasmin 17:01

Ihr habt ja auch schon mal andere Inhalte, jetzt zum Beispiel das Thema Demokratie ist ja in letzter Zeit stark gefördert worden. Was ist denn mit dem Bereich Bürgerbeteiligung über so Bildschirme also, dass man die sozusagen dazu aufruft, die Meinung abzugeben zu einem bestimmten Thema oder eine Wahl dadurch stärker zu fördern? Wie sind diese Themen?

You also have other content, for example the topic of democracy has been strongly promoted recently.

What about the area of citizen participation via screens, i.e. calling on people to give their opinion on a certain topic or to promote an election more strongly?

How are these topics?



von den Brincken Christian 17:27

People don't care, wenn du eine Direktmarketing Kampagne machst, dann gibt es die Faustformel, wenn du mehr als ein Promille Response hast, kannst du glücklich sein. So ist das, das heißt im Klartext, also Bürgerbeteiligung heißt, dass ich, wenn es top läuft, ein Promille der Bürger beteiligen, das sind ja nicht so viele ne, das heißt du hast eine lächerlich geringe Rücklaufquoten. Die Leute sind nicht so drauf, die Leute sind nicht so, es gibt nur ganz wenig Themen, bei Männern ist das meistens Fußball, was die Menschen stark aktiviert, ja, was die irgendwie triggert, aber sowas wie jetzt die Wahl geht da mal hin, das also ja, vergiss es, was funktioniert, deswegen machen wir es, du kannst jetzt fragen wieso macht ihr das denn dann? Antwort es funktioniert implizit ja, also nochmal ein kurzer Exkurs in, wie funktioniert das Gehirn? Du hast vereinfacht formuliert, das ist jetzt etwas umgangssprachlich, aber es ist nicht falsch, dass du 2 wenn du so willst Verarbeitungszentren.

Wir haben komplizierte lateinischen Namen, damit wird man sich das besser merken kann, werden die gerne auch Pilot und Autopilot genannt. Autopilot ist das Zentrum, was quasi intuitiv Dinge verarbeiten kann und relativ, Energieeffizient funktioniert ja, das heißt, das kann relativ viel, also ein einfaches Beispiel, wenn ich dir den Ball zuwerfe und sagt Fangen bitte und oder wirf mal zurück zu mir, dann wird dir das wenn du nicht völlig Panne bist, ziemlich schnell gelingen, du fängst das Ding und wirfst zurück. Dafür musst du eine ganze Menge Berechnung anstellen, wie fliegt der Ball? Ist hier Wind? Wie muss ich meine Hände halten, wann muss ich die Arme

hochnehmen, wann muss ich meine Hand formen, um etwas zu fangen? Wie müssen meine Finger funktionieren, das sind eine Menge an Befehlen und an Dingen, die da irgendwie stattfinden. Ein Computer den du programmiert, dass der einen Ball fangen kann, hat richtig Rechenkapazität ne, das ist richtig ne Maschine wo richtig was abgeht und dann wirfst du den wieder zurück und wenn ich sag, war's jetzt anstrengend, sagst du nee. Das kannst du tausendmal machen hintereinander, dir wird irgendwann langweilig, das ist dein Auto Pilot, dein intuitives System, was intuitiv bestimmte Dinge macht. Dein Pilot ist quasi das aktive System, wie der Pilot beim Flugzeug, der aktiv startet und landet.

Das brauchst du zum Beispiel, wenn ich sag, ich geb dir jetzt mal 15 zweistellige Zahlen addier dir die mal bitte, das kriegst du hin $17 + 13 + 9 + 2 + 8 + 24$ usw. kriegst du hin ne, aber du brauchst dann schon ja also so ein bisschen so ein paar Sekunden, danach sagst du das ist aber anstrengend, wenn ich dich das eine Stunde lang machen lasse bist du völlig fertig.

Von der Rechenkapazität her für den Computer, jeder 1€ Taschenrechner kann das mit links dreimal so schnell wie du, wenn ich sage multipliziere oder dividiere mal, dann bist du als Mensch am Ende und der Computer der 1€ Taschenrechner kann das. Das ist der Pilot so. Außenwerbung funktioniert dadurch, dass es diesen Autopilot auflädt, das heißt, ich werde nicht unterbrochen, es arbeitet mit dem Format, in dem dein Gehirn funktioniert, nämlich mit Bildern.

Und ich packe diese Bilder in einen Rahmen und ich lasse sie sich ständig wiederholen und dadurch wird dieses Bild in deinem Kopf verankert.

Also man könnte, wenn du gemein bist, wirst du sagen flüchtig, aber es ist jedenfalls nicht ein aktiver Vorgang, ich sag nicht „da ist ein Bild alle mal

gucken“ sondern du gehst daran vorbei und sagst war da jetzt 1 oder weiß ich nicht vielleicht.

Viele andere Formen der Werbung auch das, über das wir hier reden Engagement funktioniert über Unterbrechung. Du gehst ja nicht irgendwo hin, um das hier zu konsumieren, sondern du bist am Bahnhof, willst irgendwo hinfahren, ich sag ey stopp Frau Schmank, stehen bleiben nicht das, was sie jetzt gemacht haben, nicht weiter machen, nicht auf das Handy weiter gucken, nicht zum Gleis gehen, nicht was zu essen kaufen, nicht mit ihrem Partner telefonieren, sondern Achtung jetzt zu mir gucken ja, ich trete dir voll auf den Fuß so, ich hab deine volle Aufmerksamkeit dadurch für einen kurzen Moment.

Aber ich arbeite mit deinem Schmerzzentrum, ich unterbreche dich, produziert ja Schmerz und mit deinem Piloten, das kostet dich eine Menge Power, eine Menge Kapazitäten, eine Menge Energie, ja, dein Gehirn wiegt vielleicht ein Kilo oder anderthalb, also ein Bruchteil deines Körpergewichts, verbraucht 30% deiner Energie, also versucht dein Körper möglichst wenig Gehirn zu benutzen und ist total genervt.

Deswegen können wir uns nicht lange konzentrieren, wenn ich sag hier addier mal ganz viele Zahlen und die Funktionsweise von Engagement und Interaktion an Bildschirmen, all so ein Kram, ist in dieser Logik ein Appell an etwas was ohnehin wo du wenig Kapazität hast. Dein Pilot hat eine Kapazität, du bist aus der IT du kannst das einordnen, von ungefähr 40 bit ziemlich ja, das ist eine ziemlich schmale Kapazität. Der Autopilot von ungefähr da gibt es verschiedene Zahlen, 40000000 also, das ist ein riesiges System.

Was sein ganzes Dasein, unser Leben, unsere Entscheidungen, so wie wir halt sind als Mensch, massiv steuert.

So also, das heißt rein aus werbetheoretischer Sicht, würd ich sagen ist das

Ding Quatsch.

Oder höflich formuliert, lass es mich diplomatisch ausdrücken, sehr spitze, also wenn du das machst, dann musst du es extrem gut machen musst dir genau überlegen was ist der Mehrwert, was ist die Zielgruppe.

Musst es perfekt umsetzen, alles was damit zu tun hat perfekt exekutieren, du brauchst eine hundert Prozent perfekte Execution, alles muss klappen, dann hast du einen Punkt gemacht, aber der Aufwand es perfekt zu machen ist so groß, dass es das eigentlich von keiner Marke in dieser Welt gibt, ganz wenige tun das, Google tut es gelegentlich.

Und Apple, weil sie sagen, wir haben so viel Geld, wir können uns das leisten, das zu machen, weil es unsere Marke auflädt.

Bei Apple ist es dir Coolness und bei Google so diese Smartness und die machen das gelegentlich und manchmal auch große Sportartikelhersteller, weil die einfach die völlig irren Margen haben, Nike verkaufen Nikes für 200,00€, die werden für 4€ produziert. Das ist ein Geschäftsmodell drin, das so zu machen.

Aber die meisten anderen würden den Weg nicht gehen.

Menschen machen es nicht, das wird, wenn einer manchmal zu viel Geld hat, die in München da haben sie so einen interaktiven Agenten mal gehabt, ne, das war so ein Hologramm, hat keine Sau benutzt.

Ich habe den gesprochen, kein einziger, für ein Schweinegeld, technisch gut gemacht, das sah richtig gut aus, hat nie funktioniert, die Leute machen nichts.

Ein anderer Hinweis ist dann bin ich auch fertig, wir haben eine riesige Mafo gemacht. Mit Rheingold haben wir hundert Leute tiefenpsychologisch exploriert, um rauszufinden wie gehen Menschen mit Innovationen und überhaupt so mit Themen um, long Story short, was du merkst ist, der

gemeine Mensch in Deutschland baut sofort Skepsis auf, wenn er den Eindruck hat, die Souveränität über einen Prozess verloren zu haben. Also wenn man zum Beispiel so eine Apple Watch hat, dann kommt ja manchmal vor, dass die sich in Gespräche einschaltet. Du sitzt mit irgendwie dem Partner zusammen, ihr habt irgendwie ein ernstes Gespräch und auf einmal sagt die Uhr „das ist eine gute Idee Jasmin, hat ihr solltet heiraten“ und man denkt jetzt wa, dann hast du Tage lang ein komisches Gefühl und denkst wie kann das sein usw. wahrscheinlich hast du es durch eine Handbewegung ausversehen aktiviert. Ist ein riesiges Problem; also immer wenn du das Gefühl Dinge zu beherrschen Leuten wegnimmst, werden sie skeptisch und bauen eine Art Widerstand dagegen auf und öffnen sich dir nicht.

Deswegen tun sich so viele Menschen mit KI schwer, weil sie nicht das Gefühl haben, dass sie das souverän beherrschen, sondern weil das irgendwie so eine Faszination ist, eine Magie, aber andererseits aber auch eine Unwägbarkeit drinsteht und Unkontrollierbarkeit, das heißt, du musst also so eine Interaktion total Konsumenten souverän designen, das macht es nochmal ganz schön schwierig, also was ich dir sage ist, eine Interaktion mit öffentlichen Bildschirm, im Design so zu designen, dass all das funktioniert, also, dass du alle Barrieren überwindest, halte ich für extrem schwierig.

Und wir haben noch eine Sache, als wir die Beacons aufgezogen haben, da haben wir gesagt wir machen erstmal einen Prototyp und bauen in einem Bahnhof in Düsseldorf 1000 Beacons rein und geben quasi alles, was man dazu wissen muss, wie man die Interaktion technisch da bewerkstelligen kann und so an Agenturen für umsonst, und sagen, wir helfen euch auch dabei und so weiter, wenn ihr da Support braucht, also ihr könnt quasi mal ein bisschen rumprobieren im Sandkasten, in der Sandbox, das macht keiner, die Geschäftsbeziehungen zwischen Agenturen und Kunden

funktioniert so nicht, weil die Agentur sagt, hey Kunde, wenn ich da mal was machen soll, dann brauch ich ein bisschen Geld, gib mir mal irgendwie hunderttausend Euro und dann sagt der Kunde, was krieg ich dafür und dann sagt die Agentur ja nichts, wir machen Erfahrung, sagt der Kunde bin ich bescheuert?

Erstens verkauft ihr die anschließend meiner Konkurrenz, zweitens hab ich davon nix, was erzähle ich meinem Controlling, nee das mach ich nicht, müsst ihr machen, dann seid ihr die bessere Agentur, sagt die Agentur sehe ich nicht ein, weil machen die anderen auch nicht und in diesem Teufelskreis kommt das Thema nicht voran, also es mir ist noch kein Design bekannt was die Barrieren, die sich da entwickeln, überwunden hätte.

People don't care, if you're doing a direct marketing campaign, there's a rule of thumb that if you get more than one per thousand responses, you can be happy.

That's how it is, so in plain language, citizen participation means that if it goes well, I get one per mille of citizens to participate, which isn't that many, so you have a ridiculously low response rate.

People aren't that into it, people aren't that into it, there are only very few topics, with men it's usually soccer, which activates people strongly, yes, which somehow triggers them, but something like the election now goes there, so yes, forget it, what works, that's why we do it, you can now ask why do you do it then?

Answer it works implicitly yes, so again a quick digression into, how does the brain work? You have simplified, that's a bit colloquial now, but it's not wrong that you have 2 if you will processing centers.

We have complicated Latin names, so to make it easier to remember, they are often called pilot and autopilot. Autopilot is the center that can process things intuitively, so to speak, and works relatively, energy-efficiently, that is, it can do relatively much, so a simple example, if I throw you the ball and say catch please and or throw it back to me, then if you're not completely broken down, you'll succeed pretty quickly, you'll catch the thing and throw it back.

You have to do a lot of calculations to do this, how is the ball flying? Is there wind? How do I have to hold my hands, when do I have to raise my arms, when do I have to shape my hand to catch something?

How do my fingers have to work, that's a lot of commands and things that somehow take place. A computer that you program so that it can catch a ball has real computing capacity, no, it's a real machine where something really happens and then you throw it back again and when I say, was it exhausting, you say nope.

You can do this a thousand times in a row, you will get bored at some point, this is your car pilot, your intuitive system, which intuitively does certain things. Your pilot is the active system, so to speak, like the pilot of an airplane who actively takes off and lands.

You need it, for example, if I say I'll give you 15 two-digit numbers, please add them up, you can do it $17 + 13 + 9 + 2 + 8 + 24$ etc. You can do it, but then you need a few seconds, then you say it's exhausting, if I let you do it for an hour you'll be completely exhausted.

In terms of computing capacity for the computer, any €1 pocket calculator can do it three times as fast as you, if I say multiply or divide times, then you as a human are finished and the computer of the €1 pocket calculator can do it. That's the pilot. Outdoor advertising works by charging this autopilot, which means I'm not

interrupted, it works with the format in which your brain works, namely with images.

And I put these images in a frame and I have them constantly repeated and that anchors this image in your head.

So you could, if you're mean, you'll say fleeting, but it's certainly not an active process, I'm not saying "there's a picture, everyone take a look" but you walk past it and say was there 1 or I don't know maybe.

Many other forms of advertising, including the one we're talking about here, work by interruption. You're not going somewhere to consume this, you're at the station, you want to go somewhere, I say ey stop Mrs. Schmank, don't, stop what you were doing, don't continue, don't keep looking at your cell phone, don't go to the platform, don't buy something to eat, don't talk to your partner on the phone, but pay attention to me now, yes, I'll step on your foot like this, I have your full attention for a short moment.

But I'm working with your pain center, I'm interrupting you, producing pain and with your pilot, that costs you a lot of power, a lot of capacity, a lot of energy, yes, your brain weighs maybe a kilo or a kilo and a half, so a fraction of your body weight, uses 30% of your energy, so your body tries to use as little brain as possible and is totally annoyed.

That's why we can't concentrate for long when I say here add up a lot of numbers and the way engagement and interaction on screens works, all that kind of stuff, is in this logic an appeal to something where you have little capacity anyway.

Your pilot has a capacity, you're from IT you can categorize that, of about 40 bits pretty yes, that's a pretty narrow capacity. The autopilot of about there are different numbers, 40000000 so it's a huge system.

It massively controls our entire existence, our lives, our decisions, the way we are as humans. So, purely from an advertising theory perspective, I would say it's garbage. Or to put it politely, let me put it diplomatically, very pointedly, no, so if you do it, you have to do it extremely well, you have to think carefully about what the added value is, what the target group is.

You have to implement it perfectly, execute everything that has to do with it perfectly, you need one hundred percent perfect execution, everything has to work, then you've made a point, but the effort to do it perfectly is so great that no brand in this world actually does it, very few do it, Google does it occasionally.

And Apple, because they say we have so much money, we can afford to do that because it supercharges our brand. With Apple it's the coolness and with Google it's this smartness and they do it occasionally and sometimes big sporting goods manufacturers do it too, because they simply have completely insane margins, Nike sell Nikes for €200.00, they're produced for €4. It's a business model to do it that way. But most others wouldn't go down that route. People don't do it, sometimes when someone has too much money, the ones in Munich once had an interactive agent like that, no, it was a hologram, nobody used it

I spoke to him, not a single one, for a penny, technically well done, it looked really good, it never worked, people don't do anything.

Another hint is that I'm done, we did a huge survey. With Rheingold, we explored a hundred people in depth psychology to find out how people deal with innovations and topics in general, long story short, what you notice is that the

average person in Germany immediately builds up skepticism when they have the impression that they have lost sovereignty over a process.

So if you have an Apple Watch, for example, it sometimes happens that it intervenes in conversations.

You're sitting with your partner, you're having a serious conversation and suddenly the watch says "that's a good idea Jasmin, you should get married" and you think wa, then you have a strange feeling for days and think how can that be etc. You've probably accidentally activated it by moving your hand. It's a huge problem; so whenever you take the feeling of control away from people, they become skeptical and build up a kind of resistance to it and don't open up to you.

That's why so many people have a hard time with AI, because they don't have the feeling that they can master it confidently, but because it's somehow so fascinating, magical, but on the other hand there's also an unpredictability and uncontrollability, which means you have to design such an interaction in a totally consumer-centric way, which makes it quite difficult again, so what I'm telling you is to design an interaction with a public screen in such a way that all of this works, so that you overcome all barriers, I think that's extremely difficult.

And we have another thing, when we set up the beacons, we said we would first make a prototype and install 1000 beacons in a train station in Düsseldorf and give virtually everything you need to know about how you can technically manage the interaction and so on to agencies for free, and say we'll help you with that and so on if you need support, so you can kind of try things out in the sandbox, in the sandbox, nobody does that, the business relationship between agencies and clients doesn't work like that, because the agency says, hey client, if you want me to do something, I need a bit of money, give me a hundred thousand euros somehow and

then the client says, what do I get for it and then the agency says nothing, we have experience, the client says, am I stupid?

Firstly, you then sell them to my competitors, secondly, I don't get anything out of it, what do I tell my controlling department, no, I don't do that, you have to do it, then you're the better agency, I don't see the agency, because the others don't do it either and in this vicious circle the topic doesn't make any progress, so I'm not aware of any design that has overcome the barriers that develop there.



Schmank Jasmin 28:48

Du hast ja gesagt, dass man per Bluetooth damals dann am Bildschirm zum Beispiel hätte Coupons bekommen können, wenn man sein Handy dran gehalten hätte, richtig?

You said that you could have received coupons on the screen via Bluetooth if you held your cell phone to it, right?



von den Brincken Christian 28:59

Nur die Passage reicht schon.

Just the passage is enough.



Schmank Jasmin 29:02

Okay, und das hat nicht funktioniert, richtig?

Okay, and that didn't work, right?



von den Brincken Christian 29:05

Richtig.

Right.



Schmank Jasmin 29:07

Und war's, also zu welchem Zeitpunkt war das? War in dieser Zeit das Bezahlen per Handy schon stark verbreitet?

And was it at what time? Was payment by cell phone already widespread at that time?



von den Brincken Christian 29:14

Ne, aber wir haben das zum Beispiel in, damals war Shazam noch weit verbreitet, das kennt heute keiner mehr, aber Sound Erkennung ja, die hatten damals nur mobil Reichweite von sechseinhalb Millionen und da wäre das integriert gewesen, also wenn du Shazam auf deinem Handy hattest, hättest du das SDK gehabt und welches deinem Handy die Funktionalität gibt und so ein Bluetooth Beacon zu empfangen und basierend auf dem Shazam Framework hätten Kunden dann eine Interaktion machen können.

Dummes Beispiel geh 10 mal an den neuen Taylor Swift Plakaten vorbei und lade den neusten Song runter oder irgend so sowas in der Art. Das hat nie funktioniert in diesem Falle auch aus technischen Gründen, weil der Stromverbrauch, das war noch der alte Bluetooth Standard, so groß war, dass die App unter den Top ten Verbrauchern erschienen ist, so eine App wird sofort deinstalliert.

Und dann kam die DSGVO dazwischen also entwickelt und konzipiert hatten wir das, wo von der DSGVO noch nicht die Sprache war, das ist ja also eines der wenigen Sprint Projekte gewesen, was es in der deutschen Geschichte der letzten 20 Jahre gab ja normalerweise dauert ja immer alles hier, hundert Jahre, aber der ist DSGVO, haben die erstaunlich schnell durchgeboxt. Das heißt, es gab also als wir damit angefangen haben 14, da hat noch keiner davon geredet und plötzlich ging das rasend schnell und dann war schnell der Punkt erreicht, dass du dafür ein Opt in brauchst, weil du ja Location Scouting machst und das kannst du vergessen, kein Mensch gibt dir ein opt in, opt ins gibt es ausschließlich für einen frapierend guten Service, also über „dem gibst du ein opt in“ weil sonst kommt das Auto nicht

Oder bei Tier gibt es einen Opt in, sonst findest du den Scooter nicht, also das sind Dinge, das machen die Leute dann aber mehr eben auch nicht.

No, but we did that for example in, back then Shazam was still widespread, nobody knows it anymore, but sound recognition yes, they only had a mobile range of six and a half million back then and that would have been integrated, so if you had Shazam on your cell phone, you would have had the SDK and which gives your cell phone the functionality to receive a Bluetooth beacon and based on the Shazam framework, customers could then have made an interaction.

Stupid example, walk past the new Taylor Swift posters 10 times and download the latest song or something like that.

That never worked in this case, also for technical reasons, because the power consumption, that was still the old Bluetooth standard, was so high that the app appeared among the top ten consumers, such an app is uninstalled immediately.

And then the GDPR came in between, so we had developed and designed it before the GDPR was even mentioned, which was one of the few sprint projects in German history over the last 20 years - normally everything here takes a hundred years, but the GDPR was pushed through amazingly quickly.

In other words, when we started with it, there were 14, nobody was talking about it and suddenly it went very fast and then you quickly reached the point that you needed an opt in for it, because you do location scouting and you can forget that, nobody gives you an opt in, opt ins are only given for an amazingly good service, so about "you give him an opt in" because otherwise the car won't come

Or with animals there is an opt in, otherwise you won't find the scooter, so these are things that people do, but that's all they do.



Schmank Jasmin 31:24

Mhm Ok und du hattest außerdem gesagt, dass in letzter Zeit aber das Thema QR Code wieder besser funktioniert.

Was glaubst du woran das liegt, dass das wiederum funktioniert.

Mhm Ok and you also said that the QR code has been working better again recently. Why do you think that's working again?



von den Brincken Christian 31:35

Das liegt an Covid, das liegt erstens daran, dass die Handy Nutzung in Deutschland zunimmt.

Wir sind jetzt ja so langsam auf dem Niveau, auf dem Südkorea vor 10 Jahre war, also wir haben ja bisher die Handys tatsächlich zum Sprechen, also für Telefonate benutzt, jemand, der dort lebt, der lacht sich tot, auf die Idee

kommen die überhaupt nicht, dass das noch geht, das finde ich echt lustig. Und wir fangen jetzt erst an, sie für die Dinge zu benutzen, für die in Asien schon vor 10 Jahren genutzt worden sind.

Also und aber halt immer mehr und dadurch, dass sich die Nutzung eben erweitert und du nicht mehr irgendeine App brauchst und alle mittlerweile ein iPhone haben oder ein neues Android, wo das automatisch in die Kameraapp integriert ist, deswegen kriegt das ein Kick und natürlich auch wenn man durch Covid gelernt hat was ist das Ding und ich könnte ein Handy dran halten, dann passiert irgendwas, das sind alles so Faktoren die eine Rolle spielen, also wir merken, das ist so weil es auch eben immer komplexere Thematiken gibt, die verlängert werden wollen. Weil du eben, wenn du jetzt die Diakonie bist und du wirbst für Brot für die Welt, dann willst du mehr Informationen geben als zu sagen gib Geld für Arme und du willst sagen, wie du das verwendest und wie das eingesetzt wird und dann in einen Dialog mit den Leuten kommen.

Also benutzt du den QR Code als das, was früher die Web URL war. Aber da die Web URL ja immer komplizierter wird und sich das keiner merken kann, nimmt man dann halt QR Code oft, also das merken wir schon, dass das so ein bisschen mehr zunimmt, und wir starten auch diverse Projekte jetzt, zusammen mit Connect One, weil die halt eben in der Lage sind, in den QR Code mehr Informationen reinzulegen, ja, also das ist quasi wie ein Cookie und dadurch, dass du den Cookie selbst kennst, gibts du die Permission dass der Cookie sich öffnet, ja, also jetzt ist es so, dass die Website dich fragt hey, ich hab hier einen Cookie und was erlaubst du? Und erlaubst du mir dies, das jenes und das wird noch wesentlich strenger werden in naher Zukunft.

Und die meisten haben sowieso von einem Blocker und kommen gar nicht erst so weit, ja. Und also du brauchst viel Permission, und das kriegst du nicht. Und in diesem Fall ist die Permission dadurch gegeben, dass du

aktiv das Ding schon kennst.

Ne, und damit hast du einen im Grunde genommen physischen Cookie, der einen Zeitpunkt und eine Location hat, dass die virtuellen Cookies nicht haben und aus werbetechnischer Sicht eine interessante Geschichte.

That's because of Covid, firstly because cell phone use is increasing in Germany. We're now slowly reaching the level that South Korea was at 10 years ago, so we've actually been using cell phones for talking, i.e. for phone calls, someone who lives there is laughing their head off, they wouldn't even think that this is still possible, I find that really funny.

And we're only now starting to use them for things that were already being used in Asia 10 years ago.

Well, but more and more and because the use is expanding and you no longer need any app and everyone now has an iphone or a new Android, where it is automatically integrated into the camera app, that's why it gets a kick and of course also when you have learned through Covid what the thing is and I could hold a cell phone to it, then something happens, these are all factors that play a role, so we realize that this is because there are also more and more complex topics that want to be extended. Because if you're Diakonie and you're promoting Bread for the World, then you want to give more information than just saying give money to the poor and you want to say how you're using it and how it's being used and then get into a dialog with people.

So you use the QR code as what the web URL used to be.

But since the web URL is getting more and more complicated and nobody can remember it, people often use QR codes, so we're already noticing that this is increasing a bit more, and we're also starting various projects now, together with

Connect One, because they're able to put more information into the QR code, They are able to put more information into the QR code, yes, so it's like a cookie and because you know the cookie yourself, you give permission for the cookie to open, yes, so now the website asks you hey, I have a cookie here and what do you allow? And do you allow me this, that and that will become much stricter in the near future.

And most of them have a blocker anyway and don't even get that far, yes. And so you need a lot of permission, and you don't get that. And in this case, the permission is given by the fact that you already actively know the thing.

No, and so you basically have a physical cookie that has a time and a location that the virtual cookies don't have and an interesting story from an advertising point of view.



Schmank Jasmin 34:29

Okay, könntest du dir denn vorstellen, jetzt, wo wir eben auch mehr dran gewöhnt sind mit einem Doppelklick an der Seite unseres Handys zu bezahlen, das eine andere Technologie zu eben jetzt einer anderen Zeit, wo „ich halt mein Handy wo dran und kann etwas damit tun“, vielleicht jetzt besser funktionieren würde?

Okay, could you imagine, now that we are more used to paying with a double-click on the side of our cell phone, that a different technology at a different time, where “I hold my cell phone where and can do something with it”, might work better now??



von den Brincken Christian 34:59

Weiß ich nicht, also es gibt ja natürlich das Problem, das ist ja Plattform Business, also das heißt wenn du ein Apple Phone hast, dann klar ist das mit Apple Pay super, aber von Dir im Bezahlvorgang zweigt sich Apple, ich

glaub 17% oder so und sogar teilweise mehr ab. Das ist eine Provision. Hätte selbst in den härtesten Zeiten eine Sparkasse nicht erlaubt, sich zu nehmen.

Also absoluter Wucher, das heißt wenn du also ein Geschäftsmodell betreibst, dann machst du das nur, wenn du keine andere Lösung hast. Also, du begibst dich nur in die Fänge von Apple oder Google oder Amazon, das sind ja im wesentlichen die 3 Alternativen oder Paypal wenn du absolut keinen Plan b hast, also weil du einfach die Reichweite brauchst aus der Not, du hast aber das Problem erstens, dass deine Marge brutal verringert wird, dir bleibt eigentlich nichts mehr übrig und zweitens wenn dein Geschäftsmodell sehr erfolgreich sein sollte, läufst du Gefahr, dass du kannibalisiert wirst von denen, das berühmte Ding mit Amazon wenn sie sehen Oh das trended aber gut, weil die Frau Schmank jetzt keine Ahnung irgendwie Pullover verkauft, dann ist er sehr schnell Amazon Basic und unterbietet dich im Preis und durch die Prime Funktionen im Service.

Und du kannst dir das nur noch kaufen und weil die Menge nicht hast, kriegst du eine andere Marge und bist tot, also das heißt im Klartext, die Hoffnung liegt meiner Meinung nach darin, wenn das Internet wieder dezentraler wird, also nicht mehr so Plattformen getrieben ist, ja das nennen wir die Central Web.

Das nannte man vor kurzem noch Web 3 aber Web 3 ist ja irgendwie verbrannt.

Deswegen benutzen wir den Begriff Decentral Web.

Das ist meiner Meinung nach eine grundlegende Architektur Veränderung, die Teil einer evolutionären Entwicklung ist und die passieren wird und weil die den Menschen die Souveränität zurückgibt, da sind wir wieder bei der Souveränität also, das heißt die Renaissance erleben QR Codes und

Interaktion, wenn sich NFTs verbreitet haben. Das tun Sie im Moment aber noch nicht, weil halt die 5 größten Unternehmen der Welt dagegen sind, weil es ihr Geschäftsmodell ja völlig killt ne und die Idee, die sie jetzt hatten, war zu sagen wir schenken der Menschheit KI, das ist ja nichts anderes als zu sagen bisher haben wir denen ein paar Services geschenkt, das heißt ne die Frau Schmank war so doof und hat sich von ihrem Geld ein Handy gekauft, hat dann noch den Speicher, den ich für Sie anlege bezahlt. Alle Daten, die Sie darauf hat Bilder usw. mir geschenkt, ja, und ich kann dir noch Kram verkaufen, ist ja fantastisch gelaufen so und damit die irgendwie gute Laune behält, kriegt sie Kartographie, Navigation, E-Mail und ein paar einfache Dienste, die sie irgendwie gut findet, Musik usw., damit sie halt nicht irgendwie schlecht drauf kommt.

Und irgendwann sind Leute halt dann doch schlecht drauf gekommen und dann ist es mit der Souveränität entstanden. Da hat man denen gesagt, na gut, da geben wir ihnen jetzt noch eine Hausaufgaben-mach-Maschine und einen guten Rede- Generator und eine automatische Nähmaschine, damit sie unsere sozialen Netzwerke weiter füttern können mit Content ja, das nennt man jetzt generative KI ist aber nichts anderes als der fortgesetzte Versuch, dich davon zu überzeugen, das es klug und richtig ist denen alle deine Daten zu geben, ich persönlich, das sind halt die 5 größten Unternehmen der Welt, die haben eine einheitliche Strategie, dagegen ist es schwierig anzukommen.

Ich persönlich glaube, das wird nicht lange gut gehen.

Es wird also, es ist ja eine Evolution, Web 2 ist auch eine technologische Entwicklung, die aus Web 1 entstanden ist, Evolution kannst du nicht aufhalten, auch wenn du Google bist oder Amazon oder Apple. Das heißt die Evolution, die kannst du nur bei bremsen und das tun sie, deswegen kann ich nicht sagen, wie schnell das geht.

Vor 2 Jahren hätte ich gesagt höchstens 8 Jahre noch, jetzt würde ich schon sagen mindestens das Doppelte, also man vertut sich da leicht, aber das wird kommen meiner Meinung nach.

In Ländern, die weiterentwickelt sind als wir, ist das Internet schon dezentral.

In Estland zum Beispiel oder auch in Taiwan, sind alles dezentrale Strukturen und da setzen sich solche Dinge, Interaktion und so auch sehr viel besser durch, QR Codes, Commerce Geschichten, mit dem Handy bezahlen mit dem Wearable, mit der Iris automatisch irgendwo einloggen. Das sind alles Services, die das Leben so viel einfacher und besser machen weil sie eine Architektur haben die eine klare Governance und Sicherheitsstruktur hat, dass es funktioniert, aber in Deutschland? In Deutschland sind wir ja hier in der Steinzeit.

I don't know, so of course there's the problem that this is platform business, so if you have an Apple phone, then of course it's great with Apple Pay, but Apple takes 17% or so from you in the payment process, I think, and sometimes even more. That's a commission.

Even in the hardest of times, a savings bank wouldn't have allowed itself to take it. So it's absolutely usurious, which means that if you're running a business model, you only do it if you have no other solution.

So, you only fall into the clutches of Apple or Google or Amazon, which are essentially the 3 alternatives, or Paypal if you have absolutely no plan b, i.e. because you simply need the reach out of necessity, but you have the problem firstly that your margin is brutally reduced, you actually have nothing left and secondly, if your business model is very successful, you run the risk of being cannibalized by them, the famous thing with Amazon when they see Oh that trended but well, because the

Mrs. Schmank now has no idea somehow sells sweaters, then he is very quickly Amazon Basic and undercuts you in price and through the Prime functions in service.

And you can only buy it and because you don't have the quantity, you get a different margin and you're dead, so in plain language, in my opinion, the hope lies in the Internet becoming more decentralized again, i.e. no longer so platform-driven, yes, that's what we call the Central Web. Not so long ago it was called Web 3, but Web 3 is kind of outdated. That's why we use the term Decentral Web.

In my opinion, this is a fundamental architectural change that is part of an evolutionary development that will happen and because it gives people back their sovereignty, so we're back to sovereignty, which means that QR codes and interaction will experience a renaissance when NFTs have spread. But they're not doing that at the moment because the five biggest companies in the world are against it, because it would completely kill their business model, and the idea they had now was to say we're giving AI to humanity, which is no different to saying we've given them a few services so far, which means Mrs. Schmank was stupid enough to buy a cell phone with her money and then paid for the memory I'm creating for her.

She gave me all the data she had on it, pictures etc., yes, and I can still sell you stuff, it went fantastically well and to keep her in a good mood, she gets cartography, navigation, e-mail and a few simple services that she somehow likes, music etc., so that she doesn't get into a bad mood.

And at some point, people did get into a bad mood and that's when the sovereignty came about. So they were told, well, let's give them a homework machine and a good speech generator and an automatic sewing machine so that they can continue to feed our social networks with content, yes, but that's called generative AI, it's nothing more than the continued attempt to convince you that it's smart

and right to give them all your data, I personally, these are the 5 largest companies in the world, they have a uniform strategy, it's difficult to compete with that.

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Schmank Jasmin 40:28

Okay, ich wäre damit auch am Ende meiner Fragen, wenn dir nichts mehr einfällt.

Okay, super und genau, dann hätte ich eigentlich nur noch die Frage, ob du wissen möchtest, wenn meine Dissertation fertig und veröffentlicht ist.

Okay, that brings me to the end of my questions, if you can't think of anything else. Okay, great and exactly, then I would just like to know if you would like to know when my dissertation is finished and published.



von den Brincken Christian 42:17

Ja klar, das würde mich interessieren, ne also was du gemacht hast daraus und was die anderen sagen und was deine Konsequenz ist, das ist ja für uns strategisch auch interessant, weil das Thema, wir nennen das Engaging out of home, das hat immer wieder so auf und ab und jetzt merke ich, das kriegt wieder eine Renaissance, würde mich schon interessieren.

Yes, of course, I'd be interested to know what you've made of it and what the others say and what your consequences are, that's also strategically interesting for us, because the topic, we call it engaging out of home, that has always been so up and down and now I realize that it's getting a renaissance again, I'd be interested.



Schmank Jasmin 42:31

Ja, okay, also ich schätze es dauert noch bis Herbst nächsten Jahres.

Yeah, okay, so I guess it will take until next fall.



von den Brincken Christian 42:41

Ja, na ja, gut, das ist auch richtig so.

Yes, well, good, that's right.



Schmank Jasmin 42:47

Aber genau, ich sag auf jeden Fall dann gerne Bescheid ja, es auf jeden Fall Spaß gemacht mit dir zu sprechen, dich ich auch mal kennenzulernen. Dann vielen Dank für deine Zeit und ich sag mal bis bald.

But right, I'll be happy to let you know in any case, it was definitely fun talking to you and getting to know you. Thank you very much for your time and see you soon.



von den Brincken Christian 42:51

Ja.

Gerne.

Alles klar, viel Erfolg, viel Spaß, bitte, Tschüss.

Yes.

With pleasure.

All right, good luck, have fun, please, bye.



Schmank Jasmin 43:01

Dankeschön, Tschüss.

Thank you, bye.

APPENDIX 3. Interview Transcript Michel Sebastian Erhardt

Transcript expert interview Michel Sebastian Erhardt (ID:I MSE):

14. Mai 2024, 02:27PM



Schmank Jasmin 0:07

Hallo Michel danke, dass du dir die Zeit nimmst für mein Interview, ich hatte dir ja im Vorhinein schon gesagt, dass ich zur Interaktion mit Bildschirmen im öffentlichen Raum forsche und habe ein paar Fragen mitgebracht und schätze, dass wir zirka 30 Minuten brauchen, wenn Deinerseits keine Fragen sind, würde ich einfach direkt einsteigen.

Hello Michel, thank you for taking the time for my interview, I had already told you in advance that I am researching interaction with screens in public spaces and have brought a few questions with me and estimate that we will need about 30 minutes, if there are no questions on your part, I would just jump straight in.



Michel Erhardt 0:31

Hallo Jasmin, sehr gerne, wir können direkt starten.

Hi Jasmin, with pleasure, we can start straight away.



Schmank Jasmin 0:34

Die erste Frage, die ich mitgebracht hab, du bist ja seit einiger Zeit in der Stadt Düsseldorf, was vorher in der Stadt Monheim angestellt und daher hab ich dich als Experten aus dem Bereich Städte eingeladen und würde dich gerne fragen, ob du mir einen Überblick geben kannst, wie aktuell Städte interaktive Bildschirme nutzen?

The first question I brought with me is that you've been working in the city of Düsseldorf for some time now, having previously been employed by the city of Monheim, so I've invited you as an expert on cities. I would like to ask you if you can give me an overview of how cities are currently using interactive screens?

ME

Michel Erhardt 1:04

Ja, tatsächlich habe ich mich intensiv bezüglich mal schlau gemacht. Und eigentlich ist so diese klassische interaktive Nutzung gar nicht vorhanden. Maximal einzelne Testsäulen oder Ähnliches. Diesbezüglich ist nur im Rahmen der Digitalisierungsstrategie, die jetzt letzten Monat veröffentlicht worden ist, geplant, dass in der Zentral Bibliothek und dem Amt 54 für Migration, Integration, entsprechende Leitsysteme für die Besucherinnen und Besucher angeschafft werden, um wirklich Informationen unterstützen.

Yes, I've actually done a lot of research into this.

And actually, this classic interactive use doesn't exist at all.

At most individual test pillars or something similar. In this respect, it is only planned as part of the digitization strategy, which was published last month, that the Central Library and the Office 54 for Migration and Integration will acquire appropriate guidance systems for visitors to really support information.



Schmank Jasmin 1:55

Ok, wenn du jetzt die Beispiele die du genannt hast, mal betrachtest, worin bestehen deiner Meinung nach die Vorteile, dass man für diese Fälle interaktive Bildschirme verwendet?

Ok, if you look at the examples you gave, what do you think are the advantages of using interactive screens for these cases?

ME**Michel Erhardt** 2:09

Ich denke, dass Sie Vorteile insbesondere in der Mitarbeiterinnen und Mitarbeiter Entlastung besteht, so dass ich wirklich Information an ja an den entsprechenden Stellen einfach bereitgestellt bekomme.

Großer Vorteil an den Displays wäre auch einfach eine Geräteunabhängigkeit, sodass ich nicht verschiedene Apps für unterschiedliche Operating Systems brauche. Und was glaube ich einer der größten Vorteile ist, jetzt einfach das eine Sprachbarriere einfach ja aufgelöst werden kann, ist ein interaktives Display mit ja, ich sag mal einem Besucher-Leitsystem mehrsprachig aufbaue krieg ich wahrscheinlich

ja auch nen ganz anderes na, wie soll man sagen wir sind Usability, also ein ganz anderes Feeling für den Kunden, weil er sich einfach in seiner Muttersprache verständigen und orientieren kann.

Was natürlich an so einem klassischen Empfang weniger möglich ist oder nur sehr eingeschränkt möglich.

I think that you have the advantage of reducing the workload for employees in particular, so that I can really get information to the right places.

Another big advantage of the displays would be that they are device-independent, so I don't need different apps for different operating systems. And what I think is one of the biggest advantages is that a language barrier can simply be broken down, an interactive display with a multilingual visitor guidance system is probably going to give me a completely different, well, how about that? I'd probably get a completely different usability, a completely different feeling for the customer, because they can simply communicate and orient themselves in their native language.

Which, of course, is less possible or only possible to a very limited extent at a traditional reception.



Schmank Jasmin 3:20

Ok, was glaubst du, was wiederum Hürden sind, also sowohl technischer, finanzieller als auch infrastruktureller Form bei der Überwindung mit der Einführung in einer breiteren Fläche also du hattest jetzt zwei Beispiele genannt, aber gibt es deiner Meinung nach der größeren Hürden aus diesen Bereichen warum man sowas nicht großflächiger einsetzt?

Ok, what do you think are the hurdles, both technical, financial and infrastructural, in overcoming them with the introduction in a wider area, so you have now given two examples, but in your opinion, are there any major hurdles in these areas why this is not being used on a larger scale?



Michel Erhardt 3:50

Also von meiner Sicht müssen wir so ein bisschen trennen in zwei Punkten, wo potenzielle Hürden bestehen. Einmal inhaltlicher Natur, das heißt tatsächlich wie bereite ich Content auf, wenn wir jetzt so Leitsystem nehmen, brauche ich natürlich einen individuellen Content pro Etage pro Flur, der entsprechend über entsprechenden Algorithmen das einfach erkennt.

Das heißt wirklich auch welchen Content stell ich hier bereit, wenn ich hier nichts anderes bereitstelle als das was auf duesseldorf.de oder einer anderen Internetseite zur Verfügung steht, glaub ich ist die Bereitschaft der Nutzung verhältnismäßig gering, weil dann kann ich einfach die Smartphone Nutzung würd ich höchstwahrscheinlich vorziehen gerade weil ich nicht vielleicht dann so ein Display anstehen muss. Darüber hinaus grad, wenn wir jetzt öffentlichen Raum Outdoor sprechen sind einfach noch komplexe Freigabeprozesse vorhanden, schauen wir uns mal an hier auf der Moskauerstraße vor mir ist jetzt hier im Park, ich würde dort jetzt einen interaktiven Bildschirm installieren wollen, wären technische Anforderungen wie IP 67, Vandalismusschutz, müssen dort Stromkabel tendenziell 5G Verbindung aufgebaut werden.

Selbst ja mit den Stadtwerken als ja als Stadt beziehungsweise anstatt Tochter das hinbekommt, muss die Grundstücksfrage klärt werden, das heißt, das sind sehr, sehr viele Stellen hier einfach entsprechend mit einzubeziehen, und da sind glaube ich, die großen Herausforderungen.

Herausforderungen also einmal der Hardware Teil und einmal in Form des Software Schrägstrich des Content.

So from my point of view, we have to make a distinction between two points where there are potential hurdles. Firstly, in terms of content, which actually means how do I prepare content, if we take the guidance system now, I naturally need an individual content per floor per corridor, which simply recognizes this using appropriate algorithms.

That really also means what content do I provide here, if I don't provide anything other than what is available on duesseldorf.de or another website, I think the willingness to use it is relatively low, because then I can simply use my smartphone, which I would most likely prefer precisely because I don't have to queue for a display. What's more, when we're talking about outdoor public spaces, there are simply still complex approval processes, let's take a look here on Moskauerstraße in front of me here in the park, I would want to install an interactive screen there now, there would be technical requirements such as IP 67, vandalism protection, power cables would tend to have to be set up there 5G connection.

Even with the public services as a city or instead of a subsidiary, the land issue has to be clarified, which means that there are many, many places to be involved, and I think that's where the big challenges lie.

The challenges are the hardware part and the software side of the content.



Schmank Jasmin 5:42

Und beim Content also wie ich dich verstanden hab, müsste das dann ein exklusiver Content sein, den ich nicht nur über die Interaktion mit dem Bildschirm entweder direkt am Bildschirm oder mit Scannen des Handys zum Beispiel auf meinem Smartphone bekommen kann, weil ich sonst eben direkt einfach über mein Smartphone wie zum Beispiel von der Stadt Düsseldorf die Seite aufrufen könnte, richtig?

And with the content, as I understood you, it would have to be exclusive content that I can't just get by interacting with the screen either directly on the screen or by scanning the cell phone on my smartphone, for example, because otherwise I could simply access the page directly via my smartphone, for example from the city of Düsseldorf, correct?

ME**Michel Erhardt 6:07**

Genau also in dem Moment, wo ich natürlich exakt die gleichen Informationen aus einem digitalen Gerät, was ich jederzeit dabei habe, wenn diese analog zu einem interaktiven Bildschirm sind, glaube ich, dass gerade durch die üblicherweise doch etwas schwerfälligere Bedienweise als interaktiven Bildschirms an doch eher zu einer Smartphone Nutzung übergehen würde.

Auch wenn wir jetzt die Coronapandemie hinter uns gelassen haben, dürfte hier auch einfach der Hygienefaktor ausschlaggebend sein. Weil also ich werde ja höchstwahrscheinlich lieber mit meinem Smartphone interagieren als an einem interaktiven Display, wo ich in Anführungszeichen nicht weiß wer den angepackt hat und auch wenn wir jetzt nochmal zurück spielen, was sind die Herausforderungen?

Auch so etwas muss natürlich entsprechend gereinigt, gepflegt, auch gewartet werden, vielleicht noch ergänzend auch.

So right at the moment when I naturally have exactly the same information from a digital device that I have with me at all times, if it is analogous to an interactive screen, I believe that the usually somewhat more cumbersome operation of an interactive screen would make me more likely to switch to smartphone use.

Even though we have now left the coronavirus pandemic behind us, the hygiene factor is probably also a decisive factor here. Because I will most likely prefer to interact with my smartphone than with an interactive display where I don't know who touched it in quotation marks and even if we go back now, what are the challenges?

Of course, something like this also needs to be cleaned, looked after and maintained accordingly, perhaps even supplemented.



Schmank Jasmin 7:05

Ok, dann können wir auch schon zur nächsten Frage, du kennst dich ja auch ganz gut mit dem Thema Datenschutz aus, meinst Du aus dem Bereich Datenschutz Sicherheit im Generellen gibt es nochmal besondere Hürden und wenn ja, wie könnte man diese Bedenken wiederum adressieren und versuchen dort das Risiko zu minimieren?

Ok, then we can move on to the next question, you know a lot about data protection, do you think there are any particular hurdles in the area of data protection security in general and if so, how could you address these concerns and try to minimize the risk there?



Michel Erhardt 7:26

Also besondere Hürden glaub ich in einer ja modern aufgestellten IT sollte es diesbezüglich nicht geben, was meine, mit den Faktoren die jetzt Standard sein ist einfach ein separates Netz, ne entsprechende Shop Punkt des Server's so das halt nicht ein Heck alle Displays betreffen würde, also hier das Stichwort Zero trust und entsprechende Schottung auch des Webservers. Schlussendlich ich hab hier meines Erachtens die gleichen Herausforderungen wie mit dezentralen Clients, die über einen Web-Server angebunden sind und da muss ich auch die Clients sichern und parallel dazu den Server sichern und die Analogie des Webserver sehe ich hier auch einfach in Bezug auf den Datenschutz.

Ich hab Informationen, sind öffentlich zugänglich, das heißt, hier muss ich die DSGVO berücksichtigen beziehungsweise das Einverständnis, eventuell der Mitarbeiterinnen und Mitarbeiter einholen und diese Thematik habe ich sowohl auf dem Web Server als auch für interaktive Bildschirme.

Weil diese im öffentlichen Raum zur Verfügung stehen und meines Erachtens nach sind beides Themen immer ja Thematiken, die gerne als Hürde gesehen werden, wenn aber beides von Beginn an betrachtet wird dann sind eigentlich die meisten Herausforderungen diesbezüglich einfach zu lösen, es erfordert halt nur einen

gewissen Prozess nen gewisses Minding innerhalb des Unternehmens um solche Themen direkt zu realisieren und dann würde ich unterm Strich sagen darf es oder ist es keine Hürde sondern eher eine zeitgemäße Verwaltung.

So I don't think there should be any particular hurdles in this regard in a modern IT system, which means that the factors that are now standard are simply a separate network, a corresponding store point of the server so that not one tail would affect all displays, i.e. the keyword here is zero trust and corresponding partitioning of the web server. Ultimately, in my opinion, I have the same challenges here as with decentralized clients that are connected via a web server and I also have to secure the clients and secure the server at the same time and I see the analogy of the web server here simply in terms of data protection.

I have information that is publicly accessible, which means that I have to take the GDPR into account or obtain the consent, possibly of the employees, and I have this issue both on the web server and for interactive screens.

Because these are available in the public space and in my opinion, both topics are always issues that are often seen as hurdles, but if both are considered from the outset, then most of the challenges in this regard are actually easy to solve, it just requires a certain process and a certain mindset within the company to realize such topics directly and then I would say the bottom line is that it is allowed or it is not a hurdle but rather a contemporary administration.



Schmank Jasmin 9:20

Dann komm ich auch schon zur vorletzten Frage, und zwar welche Trends oder Entwicklungen siehst du in Bezug auf die zukünftige Nutzung interaktiver Bildschirm im städtischen Umfeld?

Welche Chancen bieten sich dadurch für Städte und ihre Bewohner? Und dabei wie gesagt, geht es nicht nur um Bildschirme, an denen man direkt agiert, sondern eventuell auch sich fokussiert auf Anwendungen, die dann mit der Erweiterung des Smartphones verwendet werden können.

Then I come to the next-to-last question, namely what trends or developments do you see with regard to the future use of interactive screens in the urban environment?

What opportunities does this offer for cities and their inhabitants?

And, as I said, it's not just about screens where you can interact directly, but possibly also focused on applications that can then be used with the extension of the smartphone.

ME

Michel Erhardt 9:48

Mhm ich glaube, ein großer Trend wird hier sein gerade in einem Bezug von einem digitalen Zwilling einfach, dass ich aktuelle Sensor Daten, aktuelle Informationen ohne Rechercheaufwand, zielgerichtet angezeigt bekomme, vielleicht auch einmal leichte Tätigkeiten als Info direkt angezeigt bekomme klassische wegen mir nen interaktives Display vor einem Besprechungsraum, das heißt auch wenn das jetzt weniger für den öffentlichen Bereich war, als Erster im internen Bereich ist das aber eine Möglichkeit, ich kann jetzt sofort Informationen sehen. Selbstverständlich würde ich diese Information auch wahrscheinlich mit dem Smart Phone sehen können, aber dadurch, dass sich die Information ohne Rechercheaufwand bekomme, glaube ich ist das ein Trend eine Entwicklung oder Nutzen der vorhandenen ist und ich glaube in diese Richtung wird sich auch hier eine zukünftige Nutzung entwickeln, wenn ich weiß mit einem interaktiven Display hier links die Straße rein sind 7 Parkplätze frei, dann würde ich die Informationen wo kein Rechercheaufwand hab deutlich früher nutzen und höchstwahrscheinlich auch jeder App vorziehen weil gerade wenn ich jetzt mit dem Auto unterwegs bin, würde ich natürlich nicht schauen wo ein Parkplatz ist frei und wenn es mir angezeigt wird, würde ich dem einfach direkt folgen. Darüber hinaus glaube ich gerade das im Tourismus Bereich auch noch viele Möglichkeiten gibt, gerade um auch so eine der Stadt interaktiv erlebbar zu machen, zum Beispiel ne Stadtgeschichte ne Historie und das kann man natürlich in Verbindung mit einer App auch zu einem ja ich glaube, zu einem wirklichen Erlebnis aufbauen. Wenn ich jetzt zum Beispiel ein Teil der Stadtgeschichte übers Display lesen kann und kann dann zum Beispiel Töne in meiner Sprache über Smartphone in der App noch ja wiedergeben ich glaub dann schafft man den

Mehrwert und auch so ein Zusammenwachsen der Welt sind und dadurch auch so ein Erlebnis daraus zu schaffen.

Mhm I think a big trend here will be, especially in relation to a digital twin, simply that I get current sensor data, current information without research effort, displayed in a targeted manner, perhaps also once light activities are displayed directly as information classic because of me an interactive display in front of a meeting room, that means even if that was now less for the public area, as the first in the internal area, but that is a possibility, I can now see information immediately.

Of course, I would probably also be able to see this information with a smart phone, but the fact that I can get the information without having to do any research means that I believe this is a trend, a development or benefit of existing ones, and I believe that future use will also develop in this direction, if I know with an interactive display that there are 7 parking spaces available on the left-hand side of the street, then I would use the information much earlier where I don't have to do any research and would most likely prefer it to any app because, especially when I'm traveling by car, I would of course not look where a parking space is available and if it is displayed to me, I would simply follow it directly.

In addition, I believe that there are also many possibilities in the tourism sector, especially to make it possible to experience a city interactively, for example a city history and that can of course be combined with an app to create a real experience. If, for example, I can now read part of the city's history on the display and can then, for example, play back sounds in my language via smartphone in the app, I believe that this creates added value and also a way of bringing the world together and thus creating an experience.



Schmank Jasmin 12:14

Spannende Ideen, vielen Dank jetzt wäre ich damit auch am Ende meiner Fragen die letzte, die ich noch hätte wäre, ob du noch weitere Anmerkungen hast, Dinge, die du mir mitgeben möchtest zu dem Thema?

Exciting ideas, thank you very much, and now I've come to the end of my questions. The last thing I'd like to ask is whether you have any further comments, things you'd like to share with me on the subject?

A pink circular logo with the white letters "ME" inside.

Michel Erhardt 12:29

Ja, eine hätte ich tatsächlich noch ein Thema und zwar hab ich ja intern, weil ich noch nicht so lange bei der Stadt Düsseldorf arbeite mich diesbezüglich erkundigt und haben auch einfach mal abgewogen warum tatsächlich so wenige interaktive Displays momentan im Einsatz sind und wir sehen halt hier wirklich die Bereitstellung über andere Medien als Hauptgrund, eben schon mal darüber gesprochen, ein exklusiver Content, eine Verschmelzung der Welten könnte das Ganze fördern.

Aber jeder, der sich schon mit zu interaktiven Displays beschäftigt hat und weiß, welche Kosten darauf zu kommen weiß auf der anderen Seite auch, das eine Bereitstellung, auf klassischen Wege, zum Beispiel eine Webseite deutlich kostengünstiger ist und auch ne App dürfte im Vergleich zu einem flächendeckenden Einsatz deutlich kostengünstiger, so dass hier tatsächlich so ein bisschen die Herausforderung meiner Ansicht nach bestimmt, dass wir da so eine Konkurrenz der unterschiedlichen digitalen Geräte der unterschiedlichen Medien haben.

Yes, I actually have one more topic, and that is that I have made internal enquiries about this, because I haven't been working for the City of Düsseldorf that long, and we have also simply weighed up why there are actually so few interactive displays in use at the moment and we really do see the provision via other media as the main reason here, we have just talked about it before, an exclusive content, a merging of the worlds could promote the whole thing.

But anyone who has already dealt with interactive displays and knows what costs are involved also knows, on the other hand, that provision in the classic way, for example a website, is significantly cheaper and an app is also likely to be significantly cheaper

compared to widespread use, so in my opinion the challenge here is actually that we have such competition between the different digital devices of the different media.



Schmank Jasmin 13:45

Okay, ja auch gute Punkte, dann bedanke ich mich ganz herzlich bei dir für deinen Beitrag ich werde wie besprochen das Gespräch im Anschluss analysieren und in meine Arbeit einfließen lassen.

Möchtest du gerne eine transkribierte Version des Interviews bekommen?

Okay, good points too, then thank you very much for your contribution, I will analyze the interview afterwards as discussed and incorporate it into my work.

Would you like to receive a transcribed version of the interview?



Michel Erhardt 14:06

Ja, bitte.

Yes, please.



Schmank Jasmin 14:07

Schick ich dir gerne zu.

Und möchtest du auch, dass ich dich informiere, sobald meine Promotionsarbeit veröffentlicht wurde?

I'll be happy to send it to you.

And would you also like me to let you know as soon as my doctoral thesis has been published?



Michel Erhardt 14:16

Ja, weil das Ergebnis würde mich sehr interessieren.

Yes, because I would be very interested in the result.



Schmank Jasmin 14:19

Sehr gerne, das mache ich, dann herzlichen Dank, alles Gute für dich ich beende jetzt hier Aufzeichnung.

I'd love to, thank you very much, all the best for you, I'll finish recording here now.

APPENDIX 4. Interview Transcript Sebastian Thelen**Interview Sebastian Thelen (ID:I ST)**

10. Juni 2024, 09:38AM



Schmank Jasmin 0:05

Hallo Sebastian Danke, dass du dir Zeit genommen hast für das Interview. Ich hatte dir im Vorfeld beschrieben, dass ich zum Thema Interaktion mit Bildschirmen im öffentlichen Raum forsche und dazu will ich dir jetzt ein paar Fragen stellen und schätze eine Gesprächsdauer von circa 30 Minuten, bist du bereit?

Hello Sebastian, thank you for taking the time for this interview.

I described to you in advance that I am researching the topic of interaction with screens in public spaces and I would now like to ask you a few questions about this and estimate that the interview will last around 30 minutes, are you ready?



Sebastian Thelen 0:25

Hallo erstmal, dankeschön für deine Einladung. Vielen Lieben Dank und ich freue mich auf unsere nächsten 30 Minuten, die wir zusammen verbringen und du mir gerne ein paar Fragen stellen kannst.

Hello first, thank you for your invitation.

Thank you very much and I'm looking forward to spending the next 30 minutes together and you can ask me a few questions.



Schmank Jasmin 0:39

Super okay, dann starte ich direkt mit der ersten Frage, die lautet welche Erfolgsfaktoren gibt es bei der Anwendung von mobilen Bildschirmen im öffentlichen Raum?

Super okay, then I'll start directly with the first question, which is what are the success factors for the use of mobile screens in public spaces?



Sebastian Thelen 0:53

Ganz, ganz gute Frage, die du mir da als Beginn stellst. Faktoren sind aus meiner Sicht zu trennen in 2 verschiedene Komponenten. Du hast einmal das Werbedisplay, die Stele, das Display was es auch immer ist, an sich, wie sieht das aus?

Aus wo ist das Display, der Bildschirm dran gebracht? Das ist eine Seite, die wir gleich mal besprechen können und wo ich dir was zu erzählen kann und das andere ist na klar, der Content also das Asset. Wie wird die Werbung an sich dargestellt?

Fangen wir mit dem ersten an.

Erfolgsfaktor, was wir in an der letzten Zeit festgestellt haben ist, so individueller das Display, der Bildschirm und so neuer und so einzigartiger das Display ist, desto mehr Aufmerksamkeit erzeugst du bei den Menschen was meine ich damit?

Zwei Beispiele. Wir hatten mal eine Kampagne gemacht in Berlin sehr, sehr erfolgreich für einen Hersteller von einem Fahrrad Airbag und dazu haben wir Displays genommen, die auf einem Fahrrad drauf montiert wurden

sind.

Stell dir vor, du hast so ein Dreirad Fahrrad also hinten 2 Räder und da packst du ein ganz, ganz großen Display drauf und mit diesem Fahrrad fährst du durch die Stadt und das erzeugt extreme Aufmerksamkeit. Das ist ein Beispiel, wo du siehst, dass die Art des Displays, also der User sieht, das Display sieht was Neues, das kennt er nicht, das hat er vorher noch nicht in dieser Art gesehen.

Das erzeugt Aufmerksamkeit, ne andere Sache ist du siehst jetzt immer mehr Displays in den Städten, die begrünt werden. Das sind auch neue Sachen, wo der User sagt Okay, was ist das denn Cooles? Da schau ich mal hin und dann hast du erst mal die Aufmerksamkeit vom User bekommen und dann kommt es na klar auch noch auf den Inhalt an ja, was wird dann dargestellt?

Und dann merken wir immer mehr das Video also Bewegtbild viel, viel aufmerksamkeitsfördernder ist als Standbilder.

Bilder wir kennen es noch von vorher von früher von der Litfaßsäule die runde alte Old School Litfaßsäule, die hat aus meiner Sicht nicht mehr so die Attraktivität und die Wirkung, wie unsere neuen, modernen Displays, die beleuchtet sind.

Die Bewegtbild oder zumindest eine Ablaufreihe von verschiedenen Bildern da gibt es ein paar Regularien, die wir in den Städten dann eben haben wo wir zum Beispiel auf mobilen Displays keine Bewegtbilder, also kein Video nehmen können.

Aber Ablaufbilder schnell hintereinander sind wieder erlaubt, aber das erzeugt Aufmerksamkeit .

Also das ist ganz, ganz wichtig und wenn du das dann auch noch kombinierst, also neue Werbedisplays, neue Werbebildschirme und noch Bewegtbild beziehungsweise Videos, dann hast du aus meiner Sicht alles

schon mal dafür getan, um eine erfolgreiche Kampagne im Out-of-home Bereich anbieten zu können.

That's a very, very good question to start with.

From my point of view, factors should be separated into 2 different components. You have the advertising display, the stele, the display itself, whatever it is, what does it look like?

Where is the display, the screen attached to? That's one side that we can discuss in a moment and where I can tell you something about and the other is, of course, the content, i.e. the asset. How is the advertising itself displayed? Let's start with the first one.

Success factor, what we have noticed in recent times is that the more individual the display, the screen and the newer and more unique the display is, the more attention you generate among people - what do I mean by that?

Two examples. We once did a very, very successful campaign in Berlin for a manufacturer of a bicycle airbag and we used displays that were mounted on a bicycle.

Imagine you have a three-wheeled bike with two wheels at the back and you put a very, very large display on it and you ride through the city on this bike and that generates extreme attention.

This is an example where you can see that the type of display, i.e., the user sees something new on the display that they don't recognize, something they haven't seen before in this form. This attracts attention. Another thing is that you now see more and more displays in cities that are being greened. These are also new things where the user says, "Okay, what's this cool thing?"

I'll take a look at it." And then you've got the user's attention, and then of course it also depends on the content, right? What is being displayed?

So that is very, very important and if you then combine that with new advertising displays, new advertising screens and moving images or videos, then in my view you have already done everything you need to be able to offer a successful campaign in the out-of-home sector.



Schmank Jasmin 4:34

Okay, ja super spannend, wenn wir uns jetzt aber zusätzlich vorstellen, wir würden eine Kampagne haben, bei der wir Interaktion mit einem Nutzer hervorrufen wollen, also das kann aus dem Werbebereich sein. Das könnte aber auch etwas sein, was die Stadt zum Beispiel ausstrahlen möchte, zum Thema Politik, Bürgerbeteiligung also irgendein Thema, was eben erfordert, dass der Nutzer jetzt interagiert mit so nem Bildschirm. Wie können deiner Erfahrung nach Menschen dazu motiviert werden?

Okay, yes, super exciting, but if we now also imagine that we have a campaign in which we want to evoke interaction with a user, that could be from the advertising sector.

But it could also be something that the city would like to broadcast, for example, on the topic of politics, civic participation, i.e. some topic that requires the user to interact with a screen. In your experience, how can people be motivated to do this?



Sebastian Thelen 5:06

Mhm, ganz, ganz wichtig wenn du Motivation beziehungsweise Interaktion mit dem Menschen hervorrufen möchtest, musst du den Menschen an sich

ansprechen und seine Bedürfnisse catchen.

Also was möchte der Mensch?

Warum sollte der Mensch der User, der gerade vor dem Display steht, jetzt mit dem Bildschirm mit der Werbemessage interagieren? Und wenn du das runterbrichst, geht es um Bedürfnisse, die bei Menschen ausgelöst werden und die befriedigt werden möchten, also Wissensaufbau, Informationserlangung all das sind Punkte, die dazu beitragen, dass der User vor dem Bildschirm Zeit verbringt und dann auch hoffentlich aktiv wird und mit dem Display dann interagiert. Ganz, ganz, ganz wichtig ist na klar, wo erreiche ich gerade den User den Menschen, der vor dem Display steht, fährt, sitzt, was auch immer und wie hoch ist seine Aufmerksamkeitsspanne?

Aufmerksamkeitsspanne also ich muss schauen, dass ich die Werbung so konzipiere, dass ich den Nutzer in seiner Aufmerksamkeitsspanne erreichen kann und dass er dann na klar auch die Interaktion durchführen kann, das ist ganz ganz wichtig.

Ganz wichtig es gibt ein Beispiel an der Bushaltestelle, Du wartest auf den Bus, da bist du durchschnittlich 2 - 5 Minuten das ist was anderes, als wenn du jetzt an der Ampel stehst und ein mobiles Display von Youth Mobility auf einem Taxi Dach vorbeifährst und du damit interaktiv werden musst. Also zusammengefasst kannst du sagen ok, du musst für die individuellen Nutzergruppen ein Bedürfnis befriedigen also er muss aus meiner Sicht einen Mehrwert davon haben, um jetzt zu interagieren und mit der Marketing Kampagne sich auszutauschen beziehungsweise dafür Zeit aufzuwenden.

Mhm, very, very important if you want to create motivation or interaction with people, you have to appeal to them and meet their needs.

So what does the person want? Why should the user, who is currently standing in front of the display, interact with the screen with the advertising message?

And if you break this down, it's about needs that are triggered in people and that want to be satisfied, i.e. building up knowledge, obtaining information - these are all points that contribute to the user spending time in front of the screen and then hopefully becoming active and interacting with the display. What is very, very, very important is clearly where do I reach the user, the person standing, driving, sitting, whatever, in front of the display and what is their attention span?

Attention span, so I have to make sure that I design the advertising in such a way that I can reach the user in their attention span and that they can then clearly also carry out the interaction, that is very, very important.

Very importantly, there is an example at the bus stop, you are waiting for the bus, you are there for an average of 2 - 5 minutes, which is different from when you are standing at the traffic lights and a mobile display from Youth Mobility on a cab roof drives past and you have to interact with it.

So to summarize, you can say ok, you have to satisfy a need for the individual user groups, so from my point of view, they have to have added value in order to interact and exchange ideas with the marketing campaign or spend time on it.



Schmank Jasmin 7:20

Mhm okay, vielen Dank.

Du bist ja Experte für den Bereich Out of Home Werbung und Kampagnen Hast du Erfahrungen gemacht mit der Nutzung von QR Codes, um Interaktion hervorzurufen?

Wenn ja, was sind deine Erkenntnisse daraus?

Mhm okay, thank you very much. You are an expert in the field of out-of-home advertising and campaigns. Have you had any experience of using QR codes to generate interaction?

If so, what are your findings?

S

Sebastian Thelen 7:42

QR Code ist ehrlicherweise das, was unsere Kunden als erstes als Idee mit uns teilen, wenn es darum geht, wir möchten eine interaktive Kampagne aufbauen und wenn man sich die Zahlen mal anguckt, ist die Interaktion mit QR Codes aber jetzt nicht ja, wie soll man sagen nicht so hoch. Da gibt es na klar wieder Unterschiede.

Wo der QR Code eingesetzt wird und wie man ihn verbaut aber generell muss man hier sagen QR Code ist ja eine Art Interaktion, Kunden zu bekommen, um ihn woanders hinzuleiten ne, also nicht nur auf das Werbemittel zu schauen, sondern auch noch weitergehend was zu machen, sich irgendwo einzutragen, die Daten zu hinterlegen und im Gegenzug dann auch was zu bekommen, zu erhalten ne, wir hatten eben, das Thema Bedürfnisse befriedigen, keiner möchte etwas umsonst machen, keiner gibt dir seine Zeit, sein Wissen seine Daten, wenn er im Gegenteil oder im Gegenzug nichts bekommt.

Und da kann ich dir mal 2 Beispiele geben.

Wir haben einmal eine Kampagne gemacht, mit einer großen Fastfood Kette. Da gab es einen Burger umsonst, wenn du den QR Code kennst, ohne irgendwas, was du machen musstest.

Du musst weder deine Daten eingeben, du musstest weder irgendeine Aufgabe erledigen etc pp, du bekommst einen Burger umsonst und das war verbunden mit dem nächsten Shop, beziehungsweise mit der nächsten Stelle, wo du das findest.

Das war eine Geo Kampagne, das heißt auch da wieder waren auf Autos, die Assets des Fast Foods Herstellers zu sehen, also die Werbekampagne wurde ausgestrahlt.

Und da wir Longitude und Latitude Werte auch mit tracken, siehst du dann sofort, wo das Auto sich befindet und wo die nächste Filiale des Fastfood Hersteller dann ist, und das wurde angezeigt mit dem Spruch jetzt ein Burger für dich umsonst in 80 Meter Links ist die nächste Fastfood Filiale und das Ergebnis war sehr ernüchternd.

Obwohl die potentiellen Kunden ein Burger komplett umsonst bekommt, wurde ganz, ganz wenig der QR Code genutzt.

Und wenn wir das ganze mal ein bisschen von der theoretischen und praktischen Seite dann analysieren, also von beiden Seiten, kommt man auf das Ergebnis ok die Kampagne war im Straßenverkehr Punkt 1, kann das klappen in Kombination mit einem Code? Frage.

Antwort aus der einzigen Kampagne, die wir im Straßenverkehr mit QR Code dann gemacht haben, nein, das hat nicht erfolgreich funktioniert also die Jungs und Mädels, die sich im Straßenverkehr befinden und das Display sich anschauen, haben kein großes Interesse, Interaktion zu betreiben im Straßenverkehr.

Punkt 1, anderes Beispiel Positives Beispiel.

Auf einer Messe wurden Codes mit Displays verwendet, um an einem Gewinnspiel teilzunehmen.

Das Produkt, was man oder die Produkte, die man gewinnen konnte, konnte man sofort auch mitnehmen auf der Messe.

Die Schlange war unendlich lang, die gingen durch den halben Messestand. Der Anbieter von dieser Kampagne war auch sehr groß, ein weltweites Social Media Unternehmen.

Und die Kampagne war sehr, sehr erfolgreich, also wir hatten ganz, ganz

lange Schlangen in den Messehallen, wo eben Interaktion sehr, sehr positiv angenommen worden ist und wo auch die Daten, die man eingeben musste, nämlich immer Adresse, wie man heißt, wo man herkommt und dass man die Daten danach benutzen konnte, war gar kein Problem, also was man erkennen konnte.

Zielgruppe ziemlich jung, ja, also geschätzt.

Ich hab's nicht analysiert, aber die Zielgruppe war geschätzt, im Durchschnitt in den 20er also Durchschnittsalter würde ich jetzt sagen zwischen 20 und 30 nicht älter und da war eben ein Massenandrang und da wurde eben eine Kampagne gefahren, wo man sofort auch bekommen wir das zum Thema Bedürfnisse ja, wo sofort das Bedürfnis befriedigt worden ist und man sofort etwas bekommen hat und da klappt der Einsatz von QR Codes sehr gut.

To be honest, QR codes are the first idea our customers share with us when it comes to building an interactive campaign, and if you look at the figures, the interaction with QR codes is not so high. There are clearly differences again.

Where the QR code is used and how it is installed, but in general you have to say that the QR code is a kind of interaction, to get customers to take them somewhere else, so not just to look at the advertising material, but also to do something else, to register somewhere, to enter the data and then get something in return, to receive something, we just had the topic of satisfying needs, nobody wants to do something for free, nobody gives you their time, their knowledge, their data, if on the contrary or in return they get nothing.

And I can give you two examples. We once ran a campaign with a large fast food company. They gave you a free burger if you knew the QR code, without you having to do anything. You didn't have to enter your details, you didn't have to

complete any tasks etc., you got a citizen for free and it was linked to the nearest store or the nearest place where you could find it.

It was a geo campaign, which meant that the fast food manufacturer's assets could be seen on cars, so the advertising campaign was broadcast. And since we also track longitude and latitude values, you can immediately see where the car is located and where the nearest branch of the fast food manufacturer is, and this was displayed with the slogan now a burger for you for free in 80 meters left is the nearest fast food branch and the result was very sobering.

Although potential customers get a burger completely for free, the QR code was used very, very little. And if we analyze the whole thing a bit from the theoretical and practical side, i.e. from both sides, we come to the conclusion that ok, the campaign was point 1 in road traffic, can that work in combination with a code? Question.

Answer from the only campaign we did in road traffic with a QR code, no, it didn't work successfully, so the guys and girls who are in road traffic and look at the display are not very interested in interacting in road traffic. Point 1, other example Positive example.

At a trade fair, codes with displays were used to take part in a competition. The product or products that you could win could be taken away immediately at the trade fair. The queue was endlessly long, they went through half the stand. The provider of this campaign was also very large, a global social media company.

And the campaign was very, very successful, so we had very, very long queues in the exhibition halls, where interaction was very, very positively received and where the data that you had to enter, namely always your address, what your name is, where you come from and that you could use the data afterwards, was no problem at all, so what you could see.

Target group quite young, yes, so estimated.

I haven't analyzed it, but the target group was estimated to be in their 20s on average, so I would say the average age was between 20 and 30, not older, and there was a mass rush and a campaign was run where you could get something immediately and the use of QR codes worked very well.



Schmank Jasmin 12:58

Ok, vielen Dank.

Die nächste Frage zielt darauf ab, was du dir vorstellen kannst, was es in Zukunft für weitere Anwendungsfälle geben könnte bei der Nutzung von Bildschirm und interaktiven Anwendungen im öffentlichen Raum.

Ok, thank you very much. The next question is aimed at what other use cases you can imagine for the use of screens and interactive applications in public spaces in the future.



Sebastian Thelen 13:18

Also was wir bei Uze vorantreiben, ist das Thema Informationsportal beziehungsweise Informationsbereitstellung für die Bürger der Städte wo unsere Taxis mit den jeweiligen Displays rumfahren. Stell dir vor, wir haben damit in Hamburg auch angefangen, du wohnst in einem bestimmten Viertel in Hamburg und dort gibt es eine große Chemie Fabrik, und die fängt an zu brennen.

Und die Informationen das bitte die Bürger alle Türen und Fenster geschlossen halten, kann sofort über unsere Taxis und über unsere Displays genau in diesen Gebieten geographisch eingeschränkt verteilt werden.

Das heißt einer von unseren oder mehrere von unseren 500 Displays in Hamburg, die sich gerade in diesem Viertel bewegen, weiß ich was hundert Stück zeigen sofort diese Informationen an und die Bürger werden gewarnt, dass sie bitte reingehen sollen, ihre Fenster und Türen schließen sollen. Ganz, ganz wichtig also, wir erreichen die Leute, die dann auf der Straße sind, die direkt gefährdet sind und denen können wir Informationen sofort zur Verfügung stellen.

Das hat wiederum so zum Ziel oder die Auswirkung daraus ist, dass die Bürger und Bürgerinnen das Werbemedium Taxi Add akzeptieren und immer mal wieder, wenn sie das Taxi Add sehen oder das Display sehen, drauf schauen, ob es neue Informationen für ihren regionalen Bereich gibt und zur Verfügung gestellt werden.

Wir hatten das zum Beispiel auch mal im Falle eines Kindes was vermisst worden ist, wo wir sofort reagieren konnten ein Foto von einem Kind drauf spielen konnten und sagen Ok, dieses Kind wird vermisst, bitte haltet alle eure Augen und Ohren auf und helft uns, dieses Kind zu suchen und das ist aus meiner Sicht ne Möglichkeit der Interaktion also Informationsaufnahme. Aufnahme, ich gebe den Bürger was, Informationen, die sehr wichtig sind. Und auf der anderen Seite akzeptiert der das Taxi als Werbemittel, ja, also schaut hin und schaut sich auch an, was darüber daneben ausgestrahlt wird übrigens auch ein Thema Regionalität ne also wir machen Geo lokale Werbung, das heißt in den Viertel werden dann auch zum Beispiel neue Restaurants für das Viertel gezeigt, also der User, der Mensch der Bürger bekommt auch noch Informationen, was jetzt im Viertel neu ist, ja, neue Restaurants, neues Sportangeboten, neue Beautysalon und so weiter und sofort also wirklich ganz, ganz spannende Möglichkeiten, hier interaktiv mit

dem User zu werden und das eben auf regionaler Ebene. Das ist sozusagen das Stichwort.

So what we're driving forward at Uze is the topic of information portals or the provision of information for the citizens of the cities where our cabs drive around with the respective displays. Imagine we started this in Hamburg, you live in a certain neighborhood in Hamburg and there's a big chemical factory and it starts to burn.

And the information that citizens should please keep all doors and windows closed can be distributed immediately via our cabs and via our displays in precisely these geographically restricted areas. This means that one of our displays or several of our 500 displays in Hamburg, which are currently in this neighborhood, I know what a hundred of them, immediately display this information and the citizens are warned that they should please go inside and close their windows and doors.

Very, very importantly, we reach the people who are on the street, who are directly at risk, and we can provide them with information immediately. This in turn has the goal or the effect that citizens accept the Taxi Add as an advertising medium and look at it every now and then when they see the Taxi Add or the display to see whether there is new information for their regional area and whether it has been made available.

For example, we once had this in the case of a missing child, where we were able to react immediately by playing a photo of a child and saying Ok, this child is missing, please keep your eyes and ears open and help us to look for this child, and from my point of view this is a way of interacting, i.e. gathering information.

Recording, I give the citizen something, information that is very important. And on the other hand, he accepts the cab as an advertising medium, yes, so he watches and also looks at what is being broadcast next to it, by the way, also a topic

of regionality, so we do geo-local advertising, which means that in the neighborhoods, for example, new restaurants for the neighborhood are also shown, so the user, the citizen, also gets information about what's new in the neighborhood, yes, new restaurants, new sports offers, new beauty salons and so on and so on and immediately, so really, really exciting opportunities to become interactive with the user here and that on a regional level. That's the keyword, so to speak.



Schmank Jasmin 16:37

Okay okay, Dankeschön ich würde da direkt anschließen mit der nächsten Frage, die eigentlich zusammenfassend aus dem, was du jetzt gesagt hast schon beantwortet werden kann ich würde das einmal wiederholen, wie ich es verstanden habe.

Die Frage wäre gewesen, was die Nutzung von Bildschirm für Städte und ihre Bewohner für Chancen bietet und aus dem, was du jetzt zuletzt gesagt hast, würde ich schlussfolgern, dass insbesondere der Informationsaustausch regional und lokal dadurch stark gefördert werden kann.

Stimmst du mir zu und fällt dir vielleicht noch weiteres ein?

Okay okay, thank you, I would follow on directly with the next question, which can actually be summarized from what you have just said, I would repeat it once, as I understood it. The question would have been what opportunities the use of screens offers for cities and their inhabitants, and from what you have just said, I would conclude that the exchange of information in particular can be strongly promoted regionally and locally.

Do you agree with me and can you perhaps think of anything else?

S**Sebastian Thelen** 17:14

Ja, also hundert Prozent stimme ich dir dazu, ne also Anwendungsfall dem Bürger regionale Informationen bereitzustellen, ist auf jeden Fall ganz, ganz wichtig.

Ich kenn es auch von mir selber von anderen Anbietern da draußen und die an Kreuzungen riesen große Displays haben, wo immer das Wetter angezeigt wird regional oder die wichtigsten Informationen des Tages. Ich persönlich nutze das ja also, wenn ich die 2 Minuten an der Ampel hab, nehme ich mir die Zeit, träum dann nicht vor mich hin, sondern schau auf dieses große Display und bekomm na klar auch den einen oder anderen Werbeslot mit angezeigt und bin total happy, dass es Out-of-home-Anbieter gibt, die mir kurz und knapp Informationen für meine Region zur Verfügung stellen, also ist ein richtiger Mehrwert, der da geboten wird ja, also stimme dir hundert Prozent zu.

Yes, I agree with you one hundred percent, so providing citizens with regional information is definitely very, very important.

I've also seen it myself from other providers out there and they have huge displays at junctions where the weather is always shown regionally or the most important information of the day.

I personally use this, so when I have 2 minutes at the traffic lights, I take the time, don't daydream, but look at this large display and of course I also get one or two advertising slots and I'm totally happy that there are out-of-home providers who provide me with brief and concise information for my region, so it's a real added value that is offered there, so I agree with you one hundred percent.

**Schmank Jasmin** 18:19

Okay, gibt es denn andererseits auch Barrieren, von denen du weißt, oder die du dir vorstellen könntest, wenn man an den Ausbau von so interaktiven Bildschirm im öffentlichen Raum denkt?

Okay, on the other hand, are there any barriers that you know of, or that you could imagine, when thinking about the expansion of such interactive screens in public spaces?

S

Sebastian Thelen 18:34

Ja, also Interaktion ist er nicht nur die Punkte, die wir gerade angesprochen haben, wie QR Code, die man nutzen kann, Informationen, die verteilt werden, denk mal ein Stück weiter in die Augmented Reality zum Beispiel rein, da sind jetzt auch die ersten Kampagnen in Deutschland gefahren und da sieht es so aus, dass du auf einmal in den dreidimensionalen Raum reingesetzt, ne also die Werbung ist nicht nur auf dem Display an sich zu sehen, sondern sie kommt raus, geht in die dritte Dimension rein und das ist na klar auf der einen Seite aufmerksamkeitssteigernd ohne Ende ne also was Neues, was wir eben ganz am Anfang besprochen haben, der Überraschungseffekt ist da, hey guck mal da sowas geniales das hab ich noch nie in meinem Leben gesehen, cool was ist das denn? Denn ich bleib mal stehen und schaue es mir an und auf der anderen Seite, wenn du auf einmal die dritte Dimension noch mit dazu nimmst und es kommt raus, das kann na klar auch gerade, wo wir das Thema Verkehr gerade angesprochen haben den Verkehr beeinträchtigen, also da brauchen wir Regularien, Regeln, Spielregeln, die wir noch definieren müssen, wie wir damit umzugehen haben. Aber wenn wir die haben, kann das auf jeden Fall ein Mittel sein, wie man wieder durch Interaktion, ja und durch die dritte Ebene, also die Dreidimensionalität, die wir reinbringen, auf einmal

wieder perfekte neue Möglichkeit der Interaktion mit Usern haben kann, du kannst mit auf einmal mit der Werbemaßnahme spielen, du kannst Spiele anbieten ja, du kannst also etwas versuchen auch auf spielerische Art und Weise Informationen Wissen zu vermitteln und der User muss aber auch mitmachen.

Mitmachen was nachmachen Steps links, rechts geradeaus. Gerade wenn wir jetzt an die tiktok-Generation mal denken, ist das sehr cool, total modern, irgendwas nachzumachen auf einem Lied oder sowas warum sollten wir das nicht auch aufnehmen und auf die out of Home Werbung übertragen oder adaptieren?

Ja, wär doch lustig. Also ja, Regularien brauchen wir, also Barrieren könnten sein ok

wieder benötigen ein neues Recht für Augmented Reality, Werbemaßnahmen, um eben nicht den Verkehr zu beeinträchtigen oder eben nicht auf einmal auf dem Bürgersteig alle nur noch rumhopsen zu haben.

Aber wenn wir diese Barrieren gemeinsam definieren mit dem Rechtsstaat, Deutschland, glaube ich, können die Barrieren auch Hilfsmittel werden und ganz, ganz toll in diesen Leitplanken, die gesetzt werden, können ganz, ganz tolle Kampagnen aufgebaut werden, wo eben extremst gut interagiert werden kann. Also ja, Barrieren könnten kommen auch für Bildschirme, die es schon gibt.

Wir kennen es aus dem Verkehrssektor, Displays die leuchten, da gibt es auch Regeln ja, wie hell die Leuchten dürfen und so weiter Und das wird es auch für andere Werbemaßnahmen geben, die dann dem User nicht nur irgendwas vermitteln, sondern wo der User interaktiv werden muss, Interaktion betreiben muss und dafür gibt es Spielregeln, die aber aus meiner Sicht nicht schädlich sein müssen, sondern uns helfen in gewissen Leitplanken tolle Kampagnen aufzubauen.

Yes, so interaction is not just the points we have just mentioned, such as QR codes that can be used, information that is distributed, think a little further into augmented reality, for example, the first campaigns have now been launched in Germany and it looks like you are suddenly placed in a three-dimensional space, So the advertising is not only visible on the display itself, but it comes out, goes into the third dimension and that is clearly on the one hand attention-grabbing without end, so something new, which we discussed at the very beginning, the surprise effect is there, hey look there, something so ingenious that I've never seen before in my life, cool what is that?

Because I'll stop and take a look at it and on the other hand, if you suddenly add the third dimension and it comes out, that can of course affect traffic, just as we have just mentioned the topic of traffic, so we need regulations, rules, rules of the game that we still have to define how we have to deal with it. But if we have them, it can definitely be a way of interacting again, yes, and through the third level, the three-dimensionality that we bring in, you can suddenly have perfect new ways of interacting with users, you can suddenly play with the advertising measure, you can offer games, yes, you can try to convey information and knowledge in a playful way, but the user also has to participate. Join in and imitate what Steps left, right straight ahead. Especially when we think of the tiktok generation, it's very cool, totally modern to imitate something on a song or something like that - why shouldn't we take that up and transfer or adapt it to out-of-home advertising?

Yes, that would be fun. So yes, we need regulations, so barriers could be ok. Again, we need a new law for augmented reality, advertising measures so as not to interfere with traffic or not to have everyone just hopping around on the sidewalk at once.

But if we define these barriers together with the rule of law, Germany, I believe that the barriers can also become aids and very, very great campaigns can be set up

in these guard rails that are set, where interaction can be extremely good. So yes, barriers could also come for screens that already exist. We know it from the transport sector, displays that light up, there are also rules about how brightly they can light up and so on

And there will also be rules for other advertising measures that don't just communicate something to the user, but where the user has to become interactive, has to interact, and there are rules for that, but in my view they don't have to be harmful, they help us to create great campaigns within certain guidelines.



Schmank Jasmin 22:21

Okay, ja, vielen Dank, sehr spannende Ideen und Inhalte. Ich hätte jetzt eigentlich nur noch die Frage, ob du weitere Anmerkungen zu unserem Gespräch hast?

Okay, yes, thank you very much, very exciting ideas and content.

I would just like to ask if you have any further comments on our conversation?



Sebastian Thelen 22:33

Ja, ganz, ganz tolles Thema, mit denen du dich da auseinandersetzt, über das du forschst und ich hoffe, dass wir in Deutschland in naher Zukunft von immer mehr und mehr Kampagnen, Werbekampagnen und im Out-of-home-Bereich sehen werden, wo Menschen, Bürger, Kunden, interaktiv mitmachen können.

Das würde mich freuen und das ist, glaube ich, die richtige Richtung, in dem das ganze System weiterentwickelt wird, das Out-of-home System weiterentwickelt wird.

Yes, it's a really, really great topic that you're researching and I hope that we will see more and more campaigns, advertising campaigns and in the out-of-home sector in Germany in the near future, where people, citizens, customers can participate interactively.

That would make me happy and I think that's the right direction in which the whole system will be further developed, the out-of-home system will be further developed.



Schmank Jasmin 23:11

Ja, dann bedanke ich mich ganz herzlich für deinen Beitrag, ich werde unser Interview im Anschluss analysieren und in meine Arbeit einfließen lassen. Möchtest du gerne eine transkribierte Version von unserem Interview geschickt bekommen?

Yes, thank you very much for your contribution, I will analyze our interview afterwards and incorporate it into my work.

Would you like to receive a transcribed version of our interview?



Sebastian Thelen 23:28

Du, kannst du mir gerne zuschicken.

You are welcome to send it to me.



Schmank Jasmin 23:30

Okay und möchtest du auch über die Veröffentlichung meiner Promotionsarbeit informiert werden?

Okay and would you also like to be informed about the publication of my doctoral thesis?



Sebastian Thelen 23:36

Ne, das möchte ich nicht, nein, Spaß, sehr sehr gerne.

No, I don't want that, no, fun, I would very much like that.



Schmank Jasmin 23:40

In Ordnung, dann werde ich das natürlich gerne machen. Ich bedanke mich nochmal ganz, ganz herzlich bei dir und wünsche alles Gute für dich.

All right, then of course I'll be happy to do that. Thank you again very, very much and I wish you all the best.



Sebastian Thelen 23:49

Danke dir auch und viel Erfolg mit deiner Forschung weiterhin.

Thank you too and good luck with your research.



Schmank Jasmin 23:53

Dankeschön, Tschüss.

Thank you, bye.

S

Sebastian Thelen 23:55

Ciao.

Bye.

APPENDIX 5. Pearson's Correlations

Variable		UW
1. UW	Pearson's r	—
	p-value	—
2. B1_new	Pearson's r	-0.125
	p-value	0.077
3. B2_new	Pearson's r	-0.235
	p-value	< .001
4. B3_new	Pearson's r	-0.225
	p-value	0.001
5. B4_new	Pearson's r	-0.231
	p-value	< .001
6. B5_new	Pearson's r	-0.079
	p-value	0.266
7. M1	Pearson's r	0.573
	p-value	< .001
8. M2	Pearson's r	0.380
	p-value	< .001
9. M3	Pearson's r	0.467
	p-value	< .001
10. M4	Pearson's r	0.345
	p-value	< .001
11. M5	Pearson's r	0.422
	p-value	< .001
12. M6	Pearson's r	0.399
	p-value	< .001
13. M7	Pearson's r	0.487
	p-value	< .001
14. M8	Pearson's r	0.333
	p-value	< .001
15. M9	Pearson's r	0.368
	p-value	< .001
16. M10	Pearson's r	0.437
	p-value	< .001
17. M11	Pearson's r	0.377
	p-value	< .001
18. M12	Pearson's r	0.329
	p-value	< .001
19. M13	Pearson's r	0.342
	p-value	< .001
20. M14	Pearson's r	0.311
	p-value	< .001

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APPENDIX 6. Independent Sample T-test education

	Test	Statistic	df	p	Cohen's d
UW	Student	1.467	192.000	0.144	0.230
	Welch	1.329	87.993	0.187	0.218
M14	Student	0.081	192.000	0.936	0.013
	Welch	0.075	92.944	0.940	0.012
M10	Student	0.403	192.000	0.687	0.063
	Welch	0.387	98.683	0.699	0.062
M5	Student	-0.417	192.000	0.677	-0.065
	Welch	-0.415	106.293	0.679	-0.065
B3	Student	-0.128	192.000	0.898	-0.020
	Welch	-0.119	92.269	0.905	-0.019
B4	Student	-0.415	192.000	0.679	-0.065
	Welch	-0.407	103.271	0.685	-0.064
B2	Student	-0.568	192.000	0.570	-0.089
	Welch	-0.547	99.221	0.585	-0.087
M3	Student	-1.655	192.000	0.100	-0.260
	Welch	-1.763	125.092	0.080	-0.268
M7	Student	-1.171	192.000	0.243	-0.184
	Welch	-1.104	94.943	0.273	-0.178
M1	Student	-0.135	192.000	0.893	-0.021
	Welch	-0.132	103.287	0.895	-0.021

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APPENDIX 7. Mean values ANOVA M14

Generations	N	Mean
Baby Boomers	44	3.284
Gen X	51	3.559
Gen Y	72	3.875
Gen Z	33	4.152

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APPENDIX 8. Mean values ANOVA M10

Generations	N	Mean
Baby Boomers	44	3.307
Gen X	51	3.667
Gen Y	72	3.924
Gen Z	33	4.000

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APPENDIX 9. Mean values ANOVA B2

Generations	N	Mean
Baby Boomers	44	3.705
Gen X	51	3.500
Gen Y	72	3.743
Gen Z	33	2.894

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APPENDIX 10. Mean values ANOVA B4

Generations	N	Mean
Baby Boomers	44	4.682
Gen X	51	4.637
Gen Y	72	4.507
Gen Z	33	4.045

Created by Author with Jasp (JASP Team, 2025).

APPENDIX 11. Mean values ANOVA M7

Generations	N	Mean
Baby Boomers	42	3.500
Gen X	48	3.552
Gen Y	72	3.799
Gen Z	32	4.047

Created by Author with Jasp (JASP Team, 2025).

APPENDIX 12. Mean values ANOVA B3

Generations	N	Mean
Baby Boomers	44	4.057
Gen X	51	3.755
Gen Y	72	3.896
Gen Z	33	3.621

Created by Author with Jasp (JASP Team, 2025).

