How Digital Divide affects Public E-Services:
The Role of Migration Background

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ABSTRACT

After the private sector the public sector also tries to benefit from the advantages of electronic service delivery, in particular from lower costs and higher service quality. While more and more services are available electronically, residents' usage rates lag behind. But high usage rates and therefore a maximized potential target group, covering major parts of society, are essential prerequisite for successful public e-services. If the residents are not using the newly created electronic services, neither they benefit from better service quality nor do the public service provider save money. Digital divide research can be leveraged to maximize the potential target group of public e-service. For this purpose a focus on public e-services as level of analysis is required, since Internet access or regular Internet usage are necessary but no sufficient conditions for being able to use public e-services. This study employs qualitative research methods in an exploratory case study design to analyze the influence of migration background on the capability to use public e-services. It provides two testable propositions for further confirmatory research: Due to limited language skills and different cultural experiences, for residents with migration background Internet experience does not directly translate into confidence in their own public e-service skills.

Categories and Subject Descriptors

J.1 [**Administrative Data Processing**] – **Subjects: Government**

General Terms

Human Factors, Theory.

Keywords

E-Government, Public E-Services, E-Inclusion, Digital Divide, Migration Background, Ethnicity

1. INTRODUCTION

In the public sector, countries and their public authorities are investing significant sums in e-government to enable virtual service delivery by electronic services (e-services). For example, the US federal government is expected to have spent more than 7 billion US dollars on electronic services in 2009 [10, p. 27]. Governments are attracted by the potential of electronic service delivery to improve service quality and reduce costs [27, p. 95, 28, p. 324, 45, p. 1], which is of particular importance in deeply indebted countries. Thus, the number of electronic services is continuously growing also in Europe. For the European Union the statistical office reports that the online availability of 20 selected public services has grown from 41% in 2004 to 62% in 2007 [23].

Unfortunately, in e-government user penetration by residents lags behind. In 2009 only 29% of the European Union's individuals used some e-government service (including pure informational services such as reading a public website), this is only slightly more than in 2005 with 23% [24]. The usage rate of transactional electronic services (i.e. returned online forms) is with 12% in 2009 even considerably lower [25].

At the same time, high usage rates are highly critical to reach any of the two mentioned goals of electronic service delivery in the public sector: If the residents are not using the newly created electronic services, neither they benefit from better service quality nor do the public service provider save money. On the contrary the service providers have to spend money on the implementation of the new service channel and still have to serve a large share of residents using the (typically more expensive) physical channel (i.e. by personal interaction within the office). An e-commerce company from the private sector in this situation could focus on the attractive share of customers using the electronic channel and could ignore further channels and (challenging) customers, but an organization in the public sector can not select its target group. Its services have to be provided to all residents [13, 29].

Having high usage rates for electronic services in the public sector becomes even more important in the future. While nowadays mainly the less complex and cheaper informational services are provided electronically, in future the remaining, more complex transactional services have to be addressed [9,

31]. Thus for those challenging services higher implementation costs are expected and have to be paid for by high usage rates.

Previously focused on analyzing the provision of electronic services in countries and municipalities (i.e. supply-side) [27, p. 93, 39], e-government research has identified this challenge and is now increasingly tackling the demand side [4, 21, 27, p. 93, 39]: Besides high quality research regarding citizen-oriented selection [e.g. 6] and optimal implementation [e.g. 18, 19] of the public services for electronic service delivery, it is highly important to identify and enlarge the potential target group, namely the group of residents capable of using e-government services.

In this context Helbig et al. highlights the enormous potential of combing research on electronic services in the public sector with insights from digital divide research [27]. Research on digital divide analyzes social groups, which can for some reason not use information or communication technology (e.g. do not have Internet access or not the required skills), and the resulting implications for these groups. Since e-government services usages require information technology (i.e. the Internet) usage as an essential prerequisite, digital divide research provides an "upper bound" for electronic services usage rates in the public sector [27, p. 89]. In other words, groups of society unable to use information technology or the Internet cannot use public e-services either. But that does not necessarily mean that the reverse is true as well. If a resident is capable of using information technology and the Internet, this does not necessarily imply that he has all the skills required to use (all) e-government services (see below for a detailed explanation).

Within digital divide research multiple classical, disadvantaged minorities of society are analyzed [27, p. 91]. The most frequently researched attributes are age and gender, which already found their way into the general technology acceptance theories (e.g. into UTAUT) [50]. But the affect of, one of the more challenging attributes, migration background on the ability to use public e-services has barely been analyzed (see section 2). This is remarkable, since according to the German federal statistical office's wide definition roughly 19% of the German residents are having a migration background (see subsection 2.3) [44, p. 48]. Furthermore the group of people with migration background is particularly important for public service providers for two reasons: First, people with migration background over proportionally require some public services, e.g. social welfare benefits [17, p. 102-118]. Second, some public services are only provided for people with migration background, e.g. naturalization.

For these reasons this paper focuses on the following research question:

How does the attribute migration background affect the ability of German residents to use public e-services instead of the traditional face-to-face delivered services?

The research question is addressed by interviewing residents with as well as without migration background regarding their preference and barriers for virtual service delivery for selected public processes in a multiple case study design.

2. RELATED LITERATURE

2.1 Digital Divide

The origin of the term digital divide can be traced back to publications of the US Department of Commerce's National Telecommunications and Information Administration (NTIA) in 1998 and 1999. "Before that time more general concepts were used such as information inequality, information gap or knowledge gap and computer or media literacy" [48, p. 221]. Since no clear consensus about the definition of digital divide exists [7, p. 269, 27, p. 90, 49, p. 280-281], in this paper the plain definition of Robinson et al. is applied: "The digital divide implies that significant minorities of the population are effectively denied access to a technology that, like other public facilities like libraries and super highways, is thought to be open to anyone" [41]. The major share of research on digital divide focuses on computer and Internet haves and not-haves, but other electronic equipment such as mobile phones or digital television has been investigated as well [48, p. 222]. The key concern underlying digital divide research and policies is a growing gap between elites and disadvantaged minorities, e.g. in educational level or political participation, due to an unequal allocation of information technology (IT) access and use. These worries are justified based on IT's key role as intermediary for information access in the so called information society [48]. In his framework Wei et al. names this potentially growing gap the "digital outcome divide" [52, p. 3] (see Figure 1).
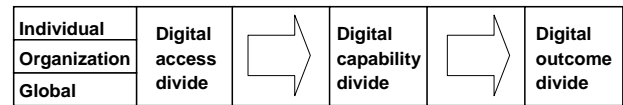
Individual Organization Global	Digital access divide		Digital capability divide		Digital outcome divide

Figure 1. Three-level digital divide framework from [52]

In the research community two main reasons are identified for this outcome: First, the "digital access divide" [52, p. 3] (or "first level digital divide" [42]) excluding people not having access to a computer or the Internet (e.g. because it is too expensive). Second, the "digital capability divide" [52, p. 3] (or "second level digital divide" [42]) excluding people not having the required skills to use computers or Internet correctly. The 'first leg' of digital divide research has been mainly descriptive in nature and published statistical numbers regarding the "digital access divide" [48]. In this research not only divides between individuals, but also the respective gaps between organizations and countries (i.e. global divide) have been analyzed [52, p. 3]. More recent research also addresses the "digital capability divide" [48, p. 221] and partially the "digital outcome divide" [e.g. 52].

Table 1. Groups of society interesting for digital divide [11]

Reason for Disadvantage	Attributes
Demographic	Older generation, females
Socio-Economic	Low education, low income, low wealth
Geographic	Rural areas, other disadvantaged regions
Physiological/ mental	Handicapped persons

Ethnical/ cultural	People with migration background, race

Regarding the minority groups to be investigated, Becker et al. names five overall groups which due to some special characteristics should be analyzed for digital divide purposes (see Table 1) [11]. In essence, the disadvantaged minorities of society, which have been investigated in the digital divide research, are the same known from other inequality research [27, p. 91, 36]. Regarding the "digital access divide" the attributes income, education, age and ethnicity were identified as determinants for individuals in developed countries at the end of the 1990s [48, p. 224-225]. But more recent research showed a closing "digital access divide" at least in western countries [48, p. 225].

2.2 Digital divide and public e-services

As mentioned earlier combining research on digital divide and electronic service delivery in the public sector has the potential to create new insights relevant for public service providers and researchers [27]. Digital divide research helps to understand, which groups of society are not capable of using information technology or the Internet and thus can not use e-services in the public sector either. We argue that not every resident able to use information technology and the Internet is necessarily capable of using (transactional) e-services from public institutions. Besides access for most tasks in the Internet "technical competencies" are required, i.e. "skills needed to operate hardware and software, such as typing" [34, p. 38]. Mossberger et al. name "information literacy" as another skill required: "Information literacy is the ability to recognize when information can solve a problem or fill a need and to effectively employ information resources" [34, p. 38]. Consequently, the digital capability divide in the framework of Wei et al. consists of two types of necessary requirements, technical competencies and information literacy.

In addition to the general information literacy for public e-services further skills are necessary, which are related to the domain of public services [11, p. 17-18]. "If a potential user is unable to directly complete an online-form of a public e-service, e.g. due to difficult or ambiguous technical terms, the user does not benefit from the public e-services, since he simply does not conceive the content. Hence, without any further online-assistance, he is denied access to the information society [i.e. to the respective public e-service]" [11, p. 18].
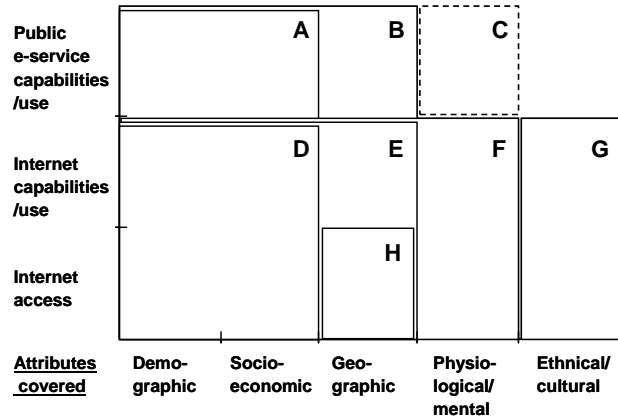

Figure 2. Clusters of digital divide studies about German residents updated based on [11]

In summary, the potential user group for public e-services consists of all residents (a) having access to the Internet (i.e. no digital access divide), who (b) are technical and informational capable of using the Internet (i.e. no digital capability divide) and (c) have the skills related to the public sector domain. The research community has to address public e-services as level of analysis (in addition to Internet access and Internet capabilities), to understand which minorities of society are not yet included in this potential user group and how to expand this group by these minorities.

Figure 2 clusters existing research studies in a matrix spanning two dimensions, (1) covered levels of analysis and (2) covered attributes regarding minorities of society. Based on the updated review of Becker et al. research with data on Germany are employed to build the clusters and Table 2 lists example studies for each cluster [11].

Table 2. German example studies for research clusters

Cluster	Example study	Comment	Source
A	Statistisches Bundesamt - Entwicklung der Informationsgesellschaft	Only age and income	[8]
B	Eurostat	Partly data only via online database accessible	[20, 43]
B	eGovernment Monitor 2010	Including frequency of public service use	[46]
C	BITV-Test 2006	Only supply side focus	[15]
D	ARD/ZDF Online-Study	-	[26]
D	Niehaves and Plattfaut 2010	Not enough data for migration background	[35]

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E	(N)online Atlas 2010	In 2005 version also migration background	[47]
F	BMI E-Partizipation-Study	-	[3]
G	ARD/ZDF Migranten und Medien 2007	Including age	[5]
H	Eurobarometer – E-Communications household survey	Including age	[22]

The purpose of this paper is to fill the main white spot identified in the matrix, namely to analyze the influence of migration background on the overall capability to use public e-services. To the best knowledge of the authors there is no study covering both, migration background and public e-services in Germany.

2.3 Influence of migration background

Within international literature several similar terms are used besides 'migration background', e.g. ethnicity, race, immigrants etc. [e.g. 14, 33, 37]. However, in these contributions these attributes are only covered with regard to Internet access, capabilities and usage, but not with public e-services as level of analysis [e.g. 1, 33, 37, 53]. One remarkable exception is the study of Bélanger and Carter [12, 14], which did not find a dominant influence of ethnicity on e-government use in the US. But they argue this surprising result might be a sampling issue [12, p. 4], which underlines the necessity of further research in this field.

According to the definition of the German federal statistical office, people living in Germany have a migration background, if they or at least one of their parents have either moved to Germany after 1949 or do not have a German passport [44, p. 31]. With regard to this wide definition almost 19% of the German population has a migration background [44, p. 48]. This large percentage is reasonable "[d]ue to the immigration of the so-called guest-workers from Mediterranean countries in the 1960's […,] who along with their children still to a large extent stay in Germany" [40, 51, p. 168]. The group of the German society with migration background is an interesting minority to study, since previous studies on the influence of migration background on computer and Internet access/capabilities/usage have shown at least a small gap between the German population with and without migration background [5, 51].

Table 3. Foreign language content for individuals on the largest German cities' web sites

City/ web address	Number of trans-actional e-service in foreign language	Information in foreign language
Berlin www.berlin.de	0	Tourism
Hamburg www.hamburg.de	0	Tourism, some forms
München www.muenchen.de	0	Tourism, some service descriptions and forms
Köln www.koeln.de	0	Tourism
Frankfurt www.frankfurt.de	0	Tourism, some service descriptions
Stuttgart www.stuttgart.de	0	Tourism
Dortmund www.dortmund.de	0	Tourism, contact information
Düsseldorf www.duesseldorf.de	0	Tourism
Essen www.essen.de	0	Tourism, contact information and some service descriptions
Bremen www.bremen.de	0	Tourism, multiple service descriptions

Furthermore analyzing the population with migration background regarding missing capabilities for public e-services is worthwhile, due to three characteristics of this minority group: (1) On average this group has lower levels of income and education than the average German population [44, p. 49-50]. (2) There might be different cultural experiences leading to missing capabilities, e.g. limited experiences with the German public sector or higher importance of personal relationships and thus limited public service experience without personal relationships. AlAwadhi and Morris [2, p. 587-588], for example, cite one focus group participant coming from the middle east to highlight the importance of personal relationship for some ethnical groups in contacts with the government: "*It's a good technology, but it will reduce the live interaction with government more and more. So I don't think that everything in our life should be reduced to simple electronic exchanges – I prefer a tangible relationship with government.*" (3) The partial lack of German language skills might be a significant barrier. The study of ARD and ZDF found a significant lack of very good German language skills in some of the ethnical groups with migration background [5, p. 76]. In addition, Ono and Zavodny identified a correlation between limited native language skills and access as well as use of information technology in the US [37]. German language skills might also be an important capability for public e-service use, since by far most of the public e-services are only provided in German. Table 3 shows the number of transactional e-services, which can be conducted in another language than German, for the ten largest cities in Germany[1]. None of the ten cities is providing any transactional e-service in any foreign language. Also very few are providing city hall related informational services (e.g. contact information for the respective public services or forms) in a foreign language such as English. Surprisingly, most of the cities only give tourist information in

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[1] Municipalities provide most of the public services in Germany. Due to higher budgets and higher numbers of residents without German language skills, the largest cities are an appropriate sample. The analysis was conducted in July 2010.

foreign languages, even though a translation of the basic services/forms cannot be regarded as very challenging.

Table 4. Barriers for conducting public service electronically compiled from [6]

Barriers	Description
perceived sensory requirements (SR)	Lack of seeing, hearing or touching involved persons or objects is perceived as barrier.
perceived relationship requirements (RR)	Limited chance of creation of social relationship/social interaction is perceived as barrier.
perceived immediate results requirements (IRR)	Asynchronous processing or delayed provisioning of the intermediate or final result is perceived as barrier.
perceived performance risk (PR)	Risk of not completing the service (as demanded) is perceived as barrier.
perceived privacy and security risk (PSR)	Data privacy or data security risks are perceived as barrier.
perceived process involvement (PI)	High personal involvement with the results of the service or the service itself is perceived as barrier.
perceived need for consultation (NC)	Requirement of consultation with the support staff is perceived as barrier.
perceived process complexity (PC)	A high amount of required information for conducting the service is perceived as reason for the need of consultation.
perceived process ambiguity (PA)	Ambiguous information regarding the service is perceived as reason for the need of consultation.

2.4 Potential barriers for use of e-services

Electronic service delivery differs from traditional face-to-face service delivery by the absence of physical interaction between the resident, the public sector employees and physical objects or documents [38]. Overby [38] names the underlying process of such impersonal services a "virtual process" and identifies "process virtualizability" as a critical prerequisite for a successful, widely accepted electronic service. Barth and Veit transferred the work of Overby from private to public sector services, such as personal registration in a city after moving to a new address [6]. In addition they updated the list of resident's potential barriers to conduct a public service virtually (instead of face-to-face) based on literature. Table 4 names and shortly describes the nine barriers, a full explanation and literature review can be found in [6]. These barriers, if present, are expected to hinder the residents to conduct the respective service electronically. The perceived presence of these barriers depends on the type of public service at hand and on the resident's characteristics. Note that the previously mentioned language issues are not included as barrier to conduct a service virtually, since the same language (i.e. only German) has to be used in the electronic and the face-to-face mode. Thus potential language problems are not seen as a barrier itself, but might have influence on the perceived importance of other barriers (e.g. need for consultation).

3. RESEARCH METHODOLOGY

Given the research questions (see section 1) and the limited control of the behavioral events according to the suggestions of Yin a case study design was chosen [54, p. 8]. Hence, we address the lack of qualitative research in digital divide literature as demanded by van Dijk [48, p. 221]. Due to the very limited research covering both migration background and public e-services an exploratory case study is necessary. At the same time, as requested by Yin [54, p. 28], we defined a research question to clearly state the purpose of the research and employed potential barriers for public e-service delivery from literature. Finally we propose testable propositions based on the results of the case study to accelerate future research, since "exploratory studies have three purposes: to discover significant variables […], to discover relations among variables, and to lay the groundwork for later, more systematic and rigorous testing of hypotheses" [30, p. 586].

3.1 Case study design

To ensure rigorous research the case study research approach by Yin [54] was closely followed.

One major distinction of the case study method to other popular research methods such as empirical survey design lies in the approach employed for generalization [54]. In the latter, so called "*statistical generalization*" [54], an inference is made based on the statistical analysis of a representative sample for the whole population. Due to typically small numbers of cases statistical generalization is not possible [54].

In case studies analytical generalizability is achieved by combining interesting cases to disqualify alternative explanations in the so called "*replication logic*" [54]. Having multiple cases boosts the analytical potential of the research project, since only in this condition cross-case comparisons are feasible. For these reasons, in this research project a multiple case study design is used: Each case study investigates residents' barriers regarding one (in future potentially virtualized) public service. In Germany, a federally organized country, three hierarchical levels for public service delivery can be distinguished: the federal government, its 16 federal states and the about 12,000 municipalities [32, p. 571]. Since municipalities deliver the major share of public services to its respective residents, this level seemed particularly appropriate for our analysis. Hence, in cooperation with a midsize German city in the state of Baden-Württemberg five of its public processes were investigated[2].

An interview protocol was designed to guide the interviews with residents requesting the respective service at the municipality. The protocol included semi-structured, open-ended questions to ensure reliability and consistency for cross-case comparison, but left room for reaction on the interviewee's responses.

Four pilot interviews were conducted and analyzed before the data collection phase. Based on the interview transcripts the interview protocol was slightly refined to improve convenience and
intelligibility.

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[2] The following five public processes were chosen: personal registration after moving, passport application, vehicle registration, church deregistration, and civil marriage.

3.2 Sampling and data collection procedure

Between April and June 2010 for each of the five processes 5-7 interviews were conducted in person with residents that requested the respective service in the municipality. On each interview day the interview period started right when the municipality opened and ended when it was closed. The interviewer randomly selected the resident for the next interview by picking the resident leaving the office after the most recent interview had been finished. All residents identified with this approach were interviewed, if they had requested one of the selected services and agreed to participate. Thus interviewees with and without migration background were included in the sample. The interviewer guaranteed privacy and confidentiality to all interviewees to ensure true and open responses. Each resident was only interviewed once and about one service only. The interviews were audio taped and transcribed afterwards. Only one interviewee declined the permission to record the interview and in this case notes were taken during the interview.

3.3 Data analysis

The transcripts of the overall 28 interviews were aggregated and stored in the case study database, which comprised 27,963 words and 85 pages of text. The data analysis was conducted using the software ATLAS.ti[3] and structured in three steps.

First, the coding scheme was developed based on the recommendations of Boyatzis by the first author, who is also the first coder [16]. The coding scheme was developed "*theory-driven*" [16] and consisted of one code for each barrier suggested by Barth and Veit (see Table 4). After initial discussions with the second coder, a research colleague, the coding scheme was refined for intelligibleness. Both coders had previous experience with e-government research and interview coding.

Second, both coders coded 4 interview transcripts form the pre-test independently from each other based on the previously defined coding scheme. Based on the differences in the coding results, the coders refined the coding scheme further, to guarantee a common understanding of all codes.

In the third step, both coders coded the 28 interview transcripts independently from each other, strictly on basis of the finalized coding scheme. The inter-rater reliability, calculated as the percentage of agreement on presence [16, p. 154-155], ranges from 77 to 100% with an average of 88%. The final coding matrix (see Table 7) contains the coding of the first coder, who had most experience with the content since he also conducted and transcribed the interviews.

4. RESULTS AND DISCUSSION

From the 28 interviews conducted, 8 persons had a migration background. For consistency, for the attribute migration background the definition of the German federal statistical office (see subsection 2.3) was applied. In comparison with the share of people with migration background in Germany, 19% according to the German federal statistical office, in the sample the share is with 29% considerably larger. This larger share provides the basis for comparisons between groups of interviewees with and without migration background, to identify potential differences in capabilities and barriers for public e-services. Hence, we are able

to apply both replication logics, the so called "*theoretical replication*" (interviewees with vs. interviewees without migration background) and the "*literal replication*" (comparison of interviews within the two groups) [54, p. 54]. Furthermore the attribute migration background and its influence on capabilities and barriers can be compared to other typical attributes of digital divide minorities, to check for the attributes relevance in this domain.

4.1 Results

Besides the attribute migration background further digital divide related attributes such as gender, age and educational level were covered in the interviews to control for their influence. The attributes highly associated with privacy concerns, namely handicap and income/wealth, were not addressed in the interviews to not risk the openness and positive atmosphere of the in-depth interviews. Also no geographic attributes were analyzed, since all interviewees were conducted in the same municipality.

Table 5. Migration background in comparison to other digital divide attributes

Reason for disad-vantage	Attribute	Attribute-share in …	
		group **without** Internet access, capability or confidence in e-service skills	control group
Demo-graphics	Female	67%(4/6)	36%(8/22)
	>40 years[4]	33%(2/6)	32%(7/22)
Socio-Economic	Low-medium education level[5]	83%(5/6)	41%(9/22)
Ethnical/cultural	Migration background	67%(4/6)	**18%**(4/22)

From the 28 interviewees 6 (21%) expressed that they are not able to use public e-services for some reason, i.e. either they had no Internet access (digital access divide), or missing Internet related capabilities (digital capability divide), or no confidence in their public e-service related capabilities. Consequently, these 6 persons are not part of the group of potential users of public e-service. To understand the barriers relevant for these 6 persons and to be able to address them appropriately, it is necessary to identify their key attributes. Hence, Table 5 shows the share of these 6 persons holding a migration background or one of the other digital divide related attributes listed above (as percentage and in absolute numbers). All of the covered attributes, with the only exception of age, mark a essential share, 67-83%, of theses 6 persons not able to use public e-services. These results are in line with the latest data from the eGovernment Monitor 2010 [46]: In this study the attribute high level of education had the

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largest influence on public e-service use. Also the attribute age had some but comparably little effect on the usage. The other two attributes covered here, migration background and gender, were not addressed in this study.

The attributes only help to address the respective target group, if the attributes hold for a larger share of the target group, but not for the respective control group. Otherwise just a large part of the whole population (including some parts of the target group) is addressed and the attributes do not help in targeting. In this context the control group consists of (all other) 22 interviewees that are confident to be able to use public e-services. The fourth column in Table 5 lists the respective attribute-shares for this control group. The attribute migration background covers with 18% a considerable low share of persons in the control group, compared to 32-41% for the other attributes.

Hence, migration background is a very interesting attribute to address the target group of people not having confidence in their public e-service skills without large wastage. Even the multi-attributive combination of the attributes 'female' and 'low-medium education level' scores with 50% of the target group and 9% of the control group not considerable better for this sample.

Table 6. Share of necessary requirements for public e-service use within groups with and without migration background

Group	Share without Internet access	Share without Internet use	Share without confidence in public e-service skills
Interviewees with migration background	25% (2/8)	13% (1/8)	**50%** (4/8)
Interviewees without migration background	15% (3/20)	15% (3/20)	**15%** (3/20)
Residents of Baden-Würtemberg	24%	-	-

Furthermore, we compared the group holding this attribute with the group without it. In Table 6 for these two groups the

Table 7. Coded barriers for public e-service usage for interviewees with migration background vs. the control group

Group	Indicator	RR*	NC*	PA*	PR*	PSR*	PI*	IRR*	PC*	SR*
with migration background	Share of interviewees with perceived barrier	**50%** **(4/8)**	**50%** **(4/8)**	**37,5%** **(3/8)**	75% (6/8)	75% (6/8)	25% (2/8)	50% (4/8)	0% (0/8)	62,5% (5/8)
w/o migration background	Share of interviewees with perceived barrier	**0%** **(0/8)**	**12,5%** **(1/8)**	**12,5%** **(1/8)**	37,5% (3/8)	37,5% (3/8)	50% (4/8)	75% (6/8)	0% (0/8)	62,5% (5/8)
Differences between groups	Multiple factor**	∞	**x4**	**x3**	x2	x2	x2	X1.5	x1	x1

* See Table 4 for the full names of the coded barriers   ** Multiple factor calculated as the larger percentage divided by the smaller

Table 8. Coded barriers for interviewees with migration background and <u>no</u> confidence in public e-service skills vs. control group

Group	Indicator	RR*	NC*	PA*	PR*	PSR*	PI*	IRR*	PC*	SR*
with migration background	Share of interviewees with perceived barrier	**75%** **(3/4)**	**75%** **(3/4)**	**50%** **(2/4)**	75% (3/4)	75% (3/4)	25% (1/4)	50% (2/4)	0% (0/4)	100% (4/4)
w/o migration background	Share of interviewees with perceived barrier	**0%** **(0/2)**	**0%** **(0/2)**	**0%** **(0/2)**	50% (1/2)	50% (1/2)	50% (1/2)	50% (1/2)	0% (0/2)	50% (1/2)
Differences between groups	Multiple factor**	∞	∞	∞	x1.5	x1.5	x2	X1	x1	x2

Table 9. Coded barriers for interviewees with migration background and <u>confidence</u> in public e-service skills vs. control group

Group	Indicator	RR*	NC*	PA*	PR*	PSR*	PI*	IRR*	PC*	SR*
with migration background	Share of interviewees with perceived barrier	25% (1/4)	25% (1/4)	25% (1/4)	75% (3/4)	75% (3/4)	25% (1/4)	50% (2/4)	0% (0/2)	25% (1/4)
w/o migration background	Share of interviewees with perceived barrier	0% (0/6)	16,7% (1/6)	16,7% (1/6)	33,3% (2/6)	33,3% (2/6)	50% (3/6)	83,3% (5/6)	0% (0/6)	50% (3/6)
Differences between groups	Multiple factor**	∞	x1.5	x1.5	x2.3	x2.3	x2	X1.7	x1	x2

respective shares of persons (a) without an Internet access in the household, (b) without regular Internet use (i.e. multiple times a week) and (c) without confidence in the own skills to use public e-services are shown. To control for a self reporting bias the answers of the interviewees regarding their confidence in public e-service use were controlled with data on their current e-commerce usage (given limited chances of public e-service use in the past).

In comparison with the latest data from a respective study for Internet access in Baden-Württemberg (see the third row in Table 6) [47, p. 11], the Internet access rates (18% for both groups taken together) in our sample is a little higher then expected. This delta can be explained by the not representative character of our qualitative study, e.g. lacking any residents from rural areas of Baden-Württemberg. Both groups, the one with migration background and the group without it, show similar shares of persons using the Internet on a regular basis. Only for Internet access in the own household the share of the group with migration background is slightly smaller, 15% vs. 25%. These results are in line with the outcome of the study of ARD and ZDF [5, p. 11]: "…the Internet is used comparable [by persons with and without migration background]." But interestingly the two (imaginary) curves of the three data points for each of the two groups looks quite different. While for the control group the share of people not having access, not using the Internet on a regular basis and not having confidence in their public e-service skills stay constant (on the 15% level), for the group of interviewees with migration background the curve is more complex. In the latter group the share of people using the Internet regularly is higher than the number of persons having Internet access at home, since the Internet is used on a regular basis in other locations than the own household, e.g. at a friends place or in Internet cafés. Furthermore in this group the share of people not confident in having the necessary skills for using public e-services is with 50% far higher than the level of no Internet access and not regular Internet use. This is a clear contrast to the control group without migration background, where Internet access and Internet use directly leads to confidence in public e-service skills.

To better understand why confidence in the own public e-service skills is that different for the two groups, a comparison of the perceived barriers (in addition to the divides addressed above) for e-service usage vs. traditional service usage was conducted. Table 7 lists the share of interviewees for which the respective barriers was coded. To eliminate the effect of the type of service on the results, the group of persons with migration background is compared with an equally sized subgroup of persons without migration background that requested the same services.[6]

Three distinct differences, i.e. percentage multiples of at least factor three, in the perceived barriers (shown in bold numbers) can be identified. First, 'relationship requirements' (RR) was perceived as barrier by 50% of all interviewees having a migration background, but by 0% of the interviewees in the control group.

Group with migration background:

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6 Both groups (with and without migration background) are also very similar in gender (4 vs. 3 women), educational level (2 vs. 3 with university-entrance diploma or diploma from academia) and age (on average 33 vs. 40 years).

"I would have a better feeling with a person in charge in front of me. The Internet is too impersonal for me." (P6:13)

"In Germany it is getting colder and colder regarding the personal relationships. You can't find the human touch any more." (P22:30)

Control group without migration background:

"Personal relationship is relative. I don't establish a real personal relationship to the administrative staff here anyway." (P14:21)

"A limited personal relationship is not an issue. Even here in the office you do not establish a strong personal relationship." (P18:34)

Second, 'need for consultation' (NC) is perceived by 50% of the group with migration background, but 12,5% of the control group.

Group with migration background:

"I had called the administrative staff before I came here, to ask questions. But still I had a few things I did not understand. The woman here explained me whom to contact and how to get the documents I needed." (P22:69)

"I realized, without the advice of the administrative staff here, I had not been able to conduct the service. It would be impossible via the Internet." (P27:65)

Control group without migration background:

"I don't need any consultation, since I already know what I want." (P1:41)

"All the information I needed, I already read in the Internet." (P10:49)

"I had no questions; this is a routine for me." (P13:66)

"No, I did not need any advice. I had no questions." (P25:44)

Third, 'perceived process ambiguity' (PA) was perceived as the reason for the 'need of consultation' by 37,5% of the group of people with migration background, but only by 12,5% of the interviewees in the control group.

Group with migration background:

"If I had to read all the information, this would not have been enough for me. I really needed to ask some questions." (P6:49)

"I did not understand everything right away. I was given a lot of information, but the most important thing was that I could ask quite a few questions and the staff explained me all the things I did not get." (P27:71)

Interestingly, the same three distinct differences in perceived barriers are present if only the parts of the two groups are compared, that have no Internet access, no regularly Internet usage or no confidence in their public e-service skills (see Table 8). In contrast, the comparison of the two groups, including only those people with Internet access, regular Internet usage and confidence in their e-service skills, does not highlight any distinct difference (see Table 9). The high

multiple factor of 'relationship requirements' is due to technical reasons (i.e. division by zero) only.

4.2 Discussion
The low share of interviewees not having Internet access or not using the Internet multiple times a week supports the literature highlighting a closing first level Internet divide [48, p. 225]. The somewhat smaller share with Internet access in their household of people having a migration background can at least partially be explained by the correlation of migration background with low income and educational level, which are known indicators for the first level digital divide [48].

Regarding the confidence in having the required skills for public e-service use, the large gap between persons with and without migration background is striking. Not only the pure difference in percentage is noticeable, but the two distinct 'curves' of Internet access, Internet usage and confidence in the required public e-service skills for the two groups (see Table 6). For people with migration background regular Internet usage does not directly translate into the required skills for public e-services, as it does for Germans without migration background. The authors see three potential reasons for this effect: (a) Due to limited German language skills complex German public e-services are out of reach for many people with migration background. In contrast, simpler Internet content (e.g. more similar to colloquial speech, non transactional services or information presented in other languages) is consumed on a regular level. (b) In comparison to Germans without migration background, people with migration background share other cultural experiences, e.g. higher perceived relationship requirements, due to limited experiences with the German public sector and service experiences indicating high relevance of personal relationships. (c) The persons having a migration background are using the Internet regularly today, but (due to a slow start) might not have reached the required Internet experience level for public e-service yet.

Based on the results of the interview-coding for perceived barriers to public e-services, we found initial support for the first two reasons (a and b). In contrast to Germans without migration background, interviewees with migration background perceived a 'need for consultation' as a distinct barrier for public e-services. This 'need for consultation' was mainly motivated by perceived process ambiguity, which indicates language issues with this kind of information. In addition the 'need for consultation' barrier was dominant for people with migration background only in the group without Internet access, usage or confidence in public e-service skills. This underlines the correlation of this barrier with public e-service skills.

With regard to the cultural dimension, we identified the 'relationship requirements' as a distinct barrier for people with migration background, but not for the respective control group. This finding indicates that the cultural experience of the residents does matter. Furthermore, for this barrier a distinct difference is only detected for the group without Internet access, usage or confidence in public e-service skills. The respective gap in Table 9 (i.e. for the group with Internet

access, usage and confidence) is actually quite small; the multiple factor is large due to technical reasons (i.e. division by zero) only.

For the third reason, i.e. people with migration background have not yet reached the required Internet experience level, we can only provide limited support based on the data of our sample: Only some people with migration background stated that they are using the Internet regularly in an Internet café or at a friends place. Thus their Internet experience level can be considered lower than the one of Germans without migration background using the Internet at home.

"Frequently I use the Internet at my friend's place." (P3:67)

In addition, the public service provider staff pointed us to another potential reason, which requires further investigation. Some services are more complex, if people with migration background are involved, e.g. civil marriage if foreign law has to be considered.

Given the results of the coding, we suggest the following propositions as key results of this exploratory case study:

Proposition 1: Due to limited German language proficiency, German residents with migration background are not confident having the necessary skills for using German public e-services, although they are using the Internet on a regular basis.

Proposition 2: Due to higher appreciation and experience with a personal relationship to public administration staff, German residents with migration background are not confident having the necessary skills for using German public e-services, although they are using the Internet on a regular basis.

4.3 Limitation and future research
The findings discussed above are based on a multiple, but single-site case study in two departments of a mid-size municipality. Thus the findings may be influenced to a certain extent by the atmosphere within this municipality as well as by the (not representative) mixture of residents living in this city and requesting services. As discussed above the higher share of people with migration background in the sample even backs the research purpose of this paper. The authors encourage further multiple site or large scale quantitative research to test the formulated propositions and to control for alternative explanations, such as the further mentioned potential reasons, which also require in depth investigation. Furthermore, a more detailed differentiation between different types of migration background is valuable to address the optimal target groups and to identify pragmatic approaches to address language barriers.

5. SUMMARY & CONCLUSION
The goal of this paper is to analyze the influence of migration background on the success of public e-services. High usage rates and hence a maximized potential target group, covering major parts of society, were identified as essential prerequisite for successful public e-services. For this purpose 'public e-services' should be addressed as level of analysis. We argued why Internet access or regular Internet usage are necessary but no sufficient conditions for citizens to be able to use public e-services. Consequently, the interviewees, persons with and

without migration background, were questioned about their confidence in their public e-service skills and perceived barriers for using public e-services instead of traditional face-to-face delivered services. In contrast to Germans without migration background, for the group of people holding this attribute regular Internet usage did not directly translate into confidence in the own public e-service skills. We found initial support for language and cultural barriers as origin for this effect and formulated the respective propositions as basis for further research. These results are valuable for the research community as well as for public service providers.

First, to the best knowledge of the authors, this study is the first covering both, migration background and German public e-services. Therefore, it addresses a clear theoretical gap and sets the agenda for further research in this field. In addition it is one of the first publications consequently following the suggestion of Helbig et al. [27], combining digital divide research with e-government research (i.e. public e-services) to tackle the demand side issues of public e-services.

Second, the results are highly relevant for public service providers. Limited language skills are identified as one key barrier excluding people with migration background from public e-services. This hinders both key goals of public e-service initiatives: A noticeable minority of the society can not benefit from better quality services (digital outcome divide) and public service providers could fail to reach high usage rates of the e-service, as required for cost saving. As suggested by Becker et al. the public service provider should revise the formulation of their e-services and try to make them as easy to grasp as possible [11, p. 83-84]. In particular they should resist using technical terms, but focusing on simple and common language. Another approach to optimize the potential target group of public e-services would be to provide e-services or assistance information in foreign languages. Our analysis has shown, that even in the largest German cities this potential has not been addressed at all. Today residents can not conduct any public e-services using a foreign language such as English. Based on studies illustrating the language capabilities [e.g. 5, p. 76] and geographic concentration of people with the same cultural migration background a very focused targeting of the critical migration groups would be possible. In this context the public sector can learn from the achievements of private corporations. For instance the medium-sized German home loan bank BKM (http://www.bkm.de) has identified the revenue potential of people with Turkish migration background. BKM has established a separate Turkish sales force and provides its homepage in German and Turkish.

One important aspect of the considerations in this work is the possible effect on cultural changes in society. Therefore, the potential impact of overcoming the identified shortcomings of a lack of multilingualism in public e-services on long-term societal integration must be considered and further investigated. Interdisciplinary work together with political science is necessary.

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