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Abstract. The start of the Covid-19 pandemic in March 2020 changed life as we know it in many ways. Many organizations, including municipalities, were forced to implement the government's new pandemic regulations and digitally map municipal processes in a short period of time. We conducted a case study over a 16-month period (subdivided into three phases) to examine the changes in public administrations. In doing so, we compared and evaluated the changes in the municipal fields of action with the digital transformation plans (pre-Covid). The findings show that changes have taken place in many fields of action, most of them in Administration, Education, People and Health. It is remarkable that some changes only started at a certain phase, like building competences, and others showed a continuous change, like IT-equipment. Finally, completely new measures have appeared in addition to a more intensive design of the digital transformation measures that were actually planned.

Keywords: Covid-19, Municipalities, municipal digital transformation

1   Introduction

The outbreak of the Covid-19 pandemic in March 2020 greatly changed lives around the world. From that point on, ways suddenly had to be found to make normal life work remotely: This applies to both personal and professional life. Therefore, lockdowns were imposed around the world to contain the virus. The lockdowns resulted in the indefinite closure of many public facilities, shopping malls, stores, cultural and sporting activities [1]. Thus, the pandemic affected all areas of life such as health, teamwork, ecology, economy, etc. The focus remains on the health sector [2]. The well-being of the patient and the preservation of life are the highest priorities. In addition, however, the economy must also be maintained in order to secure jobs and keep commodity chains running to supply citizens. Governments are also called upon to establish regulations to contain the virus and to initiate their implementation. In Germany, the implementation of these regulations is the responsibility of local municipalities.

German municipalities were thus confronted with a completely new situation in two respects. First, the municipalities were given a completely new task, namely the implementation and control of government measures. Second, it was the conversion of

municipal processes to a digital form. In concrete terms, this meant that the lockdown closed the town halls to citizens and employees. However, day-to-day business had to continue [3]. So public administrations had to act and adapt quickly to be able to work digitally and offer services to citizens online as soon as possible.

During this time, as part of our research project with local municipalities, we found that the new situation posed many challenges for municipalities. The aim of this case study is therefore to find out what changes have occurred because of Covid-19 and whether these would also have occurred in the ordinary course of municipal digital transformation. In doing so, we would like to look at the eight fields of action of the local digital transformation and consider this over time. With this in mind, we would like to answer the following research question (RQ): *What Covid-19-related changes have occurred in the municipal fields of action and how do these compare to the digital transformation without Covid-19?*

To answer our RQ, we have conducted a case study. The structure of this paper is as follows: chapter 2 provides the theoretical background. In chapter 3, we present our research design and methodology. In chapter 4, we give insights in our findings and finally, chapter 5, we discuss our findings and reveal the limits of our work.

2　　Theoretical Background

The Covid-19 pandemic has changed everyone's daily life to a great extent. From the beginning of the pandemic outbreak in March 2020 until now, unpredictable restrictions and adaptations are still required. In order to return to a more normal life, it is necessary to deal with the consequences of the pandemic and take the first steps in this direction. All this to avoid in the future well-known measures such as area-wide lockdowns, social distance, quarantine regulations, and fundamental changes in the work environment, that has occurred in the last 18 months [4, 5].

Since the beginning of the Covid-19 outbreak, many researchers have been looking at the changes and possible consequences in various research areas (e.g., health, virtual teamwork, ecology, economics, etc.). One focus, of course, has been on researching the Covid-19 virus itself, but there has also been increased research in other areas, including public administration, which has since faced major challenges [4, 6–8]. In the field of public administrations, researchers found that the biggest challenges were the closure of the citizen service and thus the social distance from the citizens, but also the procedures in the administration, that means the internal processes themselves [4, 7, 9, 9–12]. The first challenge, the closure of the citizen service, meant that many citizens services could not be implemented and continued as usual, e.g., re-registering a residence or registering a dog. Before Covid-19, citizens came to the Citizen Service Office for this purpose and the cases were processed analogously and one after the other. With Covid-19, digital capabilities had to be created abruptly, which is why McKinsey & Company postulate that "Covid-19 accelerated the adoption of digital technologies by several years." [13]. Some public administrations that had already been on the path to digitalization for several years had an advantage here, like Vienna.

However, many public administrations faced major challenges from one moment to the next, especially in rural areas where public administrations are very small [14, 15].

The pandemic has shown that everyone must adapt quickly and effectively, and that in many unexpected cases it is still possible to find and follow new paths. In the municipal context, many experts have found it surprising how many digital possibilities have been created [16, 17]. These digital opportunities were mostly part of the municipal digital transformation before Covid-19. Faro et al. describes digital transformation as follows „*Digital transformation is driving organisations to continuously transform their processes, services and products using digital technologies to remain a viable [organization]*" [16:1]. In the context of public administrations, digital transformation is seen as a key enabler of digital transformation and as part of *"an integrated element of e-government"* [17:4]. In relation to Covid-19, in many municipalities this digital transformation (e.g., rapid transition from analog to digital, increasing accessibility, or new forms of interaction with citizens) were overnight, with many municipalities not adequately prepared for it. As a result, many challenges arose both internally (planning, control, and fees) and externally (user engagement, and fees) [7, 15].

In the framework of our research project with local public administrations, we quickly realized that the challenges in the previously defined eight areas (explained below) of municipal digital transformation went far beyond the envisioned challenges that would be encountered in the process. The changes included both technological and methodological components. In practice, for example, rolling out information and communications technology (ICT) in the public administrations proved to be much more complex than previously assumed [15, 17].

Administration (Adm). This area aims to create transparency in municipal processes to make them easier and more accessible for citizens. This includes, for example, public participation in decision-making processes, or public services [8, 20].

Economy (Eco). This area is intended to maintain and strengthen municipal competitiveness and innovative strength. The beginning of the digital transformation here is the implementation of a fast, reliable, and nationwide network as well as awareness and adaptation to new innovations [21, 22].

Education (Edu). Education plays a crucial role for communities, and both supply and demand are important. Education is not only limited to students, but also includes the quality of life of citizens through smart buildings for education [13] museums, and libraries to live and educate well together [23, 24].

Health (Hea). This area includes all medical facilities and services. The medical care situation, such as the diversity of doctors' practices or the number of hospital beds, is a crucial point for this field of action and can be improved by new technologies and their networking. This is of central importance, especially in times of pandemics [2, 25].

Mobility (Mob). A reliable and well-functioning transport system in a city increases the quality of life of its citizens and the cities' attractiveness. Smart mobility is therefore understood as a comprehensive and intelligent mobility concept that takes external and internal factors into account to act in real time with the help of ICT [23, 26].

People (Peo). People are the cities' core. Only through intelligent citizens who have access to *Education* can the urban *Economy* grow. Therefore, citizens should have the

opportunity to develop, to participate in public life. These intelligent citizens are then open to new things and can actively see and implement the new innovations [20, 24].

Retail (Ret). A digital transformation is essential to ensure that city centers remain attractive and can keep up and compete with online retailing in particular. This includes, for example, various payment systems or online reservations [27, 28].

Tourism (Tou). Tourist cities are increasingly investing in digital technologies to further expand and strengthen their attractiveness and competitiveness. The cities' digital transformation can help here to strengthen the tourism sector. In times of pandemic, this is even more important as the industry is heavily affected by lockdowns. [29, 30]

3   Method

Method selection. In order to explore the different changes, which occurred due to the Covid-19 pandemic in German public administrations, we conducted a longitudinal case study [31, 32]. We focused on public administrations, as they had to cope with the most challenges. When analyzing phenomena, which are not yet fully explored and causal effects cannot be identified, case studies are a verified method [32, 33]. In detail, case studies allow to analyze phenomena while they occur [34], like in our case the effect of the Covid-19 pandemic. As our use case contains these two factors, we decided to use a long-term case study as our method. As the strength of case studies lies in their internal validity, we took several measurement steps to increase the external validity. First, we conducted all our research phases in a team with at least two researchers. The aim is to reduce idiosyncratic perceptions [35]. Furthermore, due to conducting the research in a team, we were able to implement investor triangulation [36]. Second, in order to reduce case-specific findings, we included 21 cases in a period over 15 month [32, 33].

Case Design. In our case study, we analyze the administrative changes that have been newly initiated in German public administrations, changed due to the pandemic, or accelerated in the process. This is based on 12 municipalities in a rural German district that are being supported in their digital transformation process as part of a research project. Relevant information on the 12 base municipalities can be found in **Table 1**. A district is an organizational unit that represents a next higher level of municipalities in which smaller municipalities are organized in Germany. In addition to base municipalities, we added a multi-perspective unit to the case study to include different stakeholder perspectives, called the "extended group" – see data collection. We have analyzed how Covid-19 has forced public administration to implement new initiatives, what changes have taken place in public administration, and what impact this has had on the municipal digital. We examined this at different points during the pandemic (three phases in total). A brief description of our procedure is presented below (see **Figure 1**). To answer our RQ, we focused on the actions that municipalities took to respond to the challenges they faced during Covid-19 (e.g., daily citizens service during the shutdown or new forms of work environments). Thus, the unit of analysis is the

organization, specifically municipalities in our case. As mentioned earlier, we examined 21 cases in order to have multiple cases to support the findings in the spirit of external validity and replication logic [32, 37].

Table 1. Overview of the base municipalities' characteristics

Participant	Inhabitants	Area [km^2]	Employees	Population Density
M1	277,000	1,132.9	889	245
M2	19,500	275.5	187	71
M3	7,500	71.0	50	99
M4	22,000	72.0	91	276
M5	15,000	136.0	53	110
M6	18,400	54.6	93	337
M7	14,800	81.1	95	182
M8	31,500	71.1	162	443
M9	25,000	137.4	104	182
M10	15,000	79.7	68	187
M11	103,000	114.7	1,398	898
M12	15,000	39.8	70	327

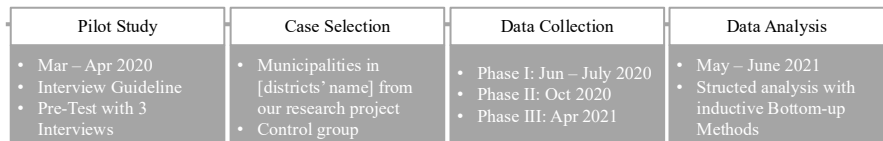| Pilot Study	Case Selection	Data Collection	Data Analysis
• Mar – Apr 2020 • Interview Guideline • Pre-Test with 3 Interviews	• Municipalities in [districts' name] from our research project • Control group	• Phase I: Jun – July 2020 • Phase II: Oct 2020 • Phase III: Apr 2021	• May – June 2021 • Structed analysis with inductive Bottom-up Methods

Figure 1. Case study's timeline and setup

Pilot Study. To test our semi-structured interview guideline, we interviewed three experts of the municipalities, who could express the municipal changes caused by Covid-19 during the first lockdown from mid of March till start of June 2020 in their municipality. We interviewed one Chief Digital Officer (CDO), one mayor, and one mobility manager in the municipalities regarding the perceived challenges, the digital measures, and other actions taken. After each interview, we analyzed the findings and adjusted our questions asked by leaving out some questions and adding some. In this way, we were able to ensure that we could query all areas of a municipality with their changes and that nothing was left out. As we noticed that our participants focused only on the most important changes that had just happened, while they left other changes out (primacy-recency-effect [38]), we decided to combine our interviews with two workshops (one before the interviews and one afterwards). In the workshops, the CDOs of the base municipalities discussed the challenges and changes, as well as newly introduced methods and tools.

Case selection. After finishing our pilot study, we conducted the case study with all 12 base municipalities from our district. As previously mentioned, the 12 base municipalities are project partners in our research project, so we knew from our collaboration that they were facing challenging changes due to Covid-19, and therefore

designed our case study this way. Those 12 municipalities are in North-Rhine-Westphalia in Germany and differ in their characteristics (e.g., number of inhabitants, area, or population density), see Table 1. Therefore, they are well suited for our case study and can provide insights beyond one specific case. To make our case study project more meaningful, we conducted a survey with an extended group between the two survey periods of the 12 municipalities. Here we also conducted interviews and a workshop. The extended group consisted not only of municipal employees but also of politicians and citizens, whom we interviewed as part of a series of lectures.

Data collection. In addition to the actual data collection, we collected background information about the base municipalities (e.g., size or number of citizens) to be able to use the interview time to only discuss challenges and changes according to Covid-19 (see Table 1). In addition, we have presented the information of all case study participants base municipalities and extended group in **Table 2**. In the following, we will take a closer look at the data collection in the three phases. Phase I took place between June and July 2020 after the first lockdown in Germany. In the pre-workshop, we made the CDOs aware of the topic and recorded initial changes. After the pre-workshop, the CDOs were sent the interview guide in advance. This allowed them to prepare and record the changes that occurred because of Covid-19. In Phase I, we conducted a total of 15 interviews (3 pilot, 12 case-based). Our case-based sample included six small- and three large-medium-sized cities, as well as one small city, one large city, and one district. We interviewed a total of eight male and two female CDOs. One female CDO is responsible for three municipalities, as they have a joint digitization project for which they have hired a joint CDO. Phase II took place in October 2020, when the first lockdown had ended and the second had not yet begun. In this phase, we surveyed the extended group which was part of a lecture series. The workshops were designed to be hybrid – 26 participants attended the digital part and 18 the face-to-face event. Among the participants were politicians, municipal employees, entrepreneurs, and citizens. In the workshop, we collected and discussed the changes that Covid-19 brought to different areas of actions. We conducted interviews on the changes with half of the presence participants to get more in-depth information. The same questionnaire as in Phase I was used for the interviews. Of those interviewed, 4 were male and 5 were female. The occupations ranged from CDO to CEO of a mobility start-up, a female student to an engaged citizen. Phase III was in April 2021, during the second lockdown in Germany. In this Phase, the base municipalities were asked again about changes due to Covid-19. The focus was on whether new aspects had been added since the last time. The same questionnaire was used for the interviews as for Phase I.

In the interviews, we looked specifically at Covid-19 changes and explored them in more detail during the duration of the pandemic. We chose an interview-driven approach to capture as many Covid-19-related challenges, initiatives, changes, and digital measures as possible. This method is more systematic and structured than a purely conversational interview and therefore fits well with our case study [39]. We designed a semi-structed interview guide to allow interviewees to speak freely and openly and to address additional aspects that we had not included in our questions. To avoid the common pitfalls of qualitative semi-structured interviews, we used Sarker's

guide to qualitative research [39, 40]. For the case study, we followed the guidelines of Darke et al [41] and conducted the interviews with two researchers. The interview was divided into two parts. The first part includes questions about the interviewee (e.g., age, background, duties, feelings toward the pandemic). The second part deals exclusively with the challenges posed by Covid-19 as well as implemented and planned measures.

Table 2. Overview of the participants

Category	Number of Citizens	Number Participants
Small Cities	< 10,000	M3
Small medium-sized cities	10,000 – 20,000	M2, M5, M6, M7, M10, M12
Large medium-sized cities	20,000 – 50,000	M4, M8, M9
Large cities	> 50,000	M11, M13 – M20
Districts		M1, M21

Data analysis. We recorded the interviews in German, transcribed them nonverbatim, and translated them into English for the purpose of this analysis. To analyze our interview transcripts, we used the software MAXQDA 2020, utilizing inductive Bottom-up Coding methods [42]. After the half of the analyzed interviews, we compared our coding scheme found and agreed on a common one with which we continued coding (axial coding) [42]. Differing opinions were discussed with the other researcher and clarified by consensus. For example, in the following quote, *"We need better equipment for working at home, such as laptops."* (M5) two independent codes ("IT equipment" and "Work requirements") were found. Finally, "IT equipment" was used as the axial code. Next, the axial codes were grouped by relevant aspects. When no new aspects of changes were found, we ended the analysis with saturation.

4   Findings

In the interviews, we looked specifically at the changes due to Covid-19 and examined these in more detail over the duration of the pandemic. In doing so, we found that there was a significant increase in changes and consequently measures in all areas of action over the duration of the pandemic, see **Table 3**.

We have listed these in order of quantity: (1) Most measures were taken in *Administration* (all participants took measures in *Administration* – 100%). (2) In *Education*, Covid-19 observed the second most changes (in Phase I of the pandemic in 7 out of 12 municipalities, in Phase II 33% of the participants and in Phase III in 11 out of 12 – 61% in total). (3) In *People*, Covid-19 observed the third most changes – 52% in total. Here visible measures were already evident in Phase I, and these increased slightly in Phases III. (4) In *Health,* the changes in Phase I have only begun in 1 of 12 municipalities. In Phase III, 12 out of 12 municipalities are now seeing changes in *Health* – 47% in total.

In the other fields of action examined, less than half of the participants saw changes, with the least changes being observed in *Mobility*. As we asked German municipalities directly instead of e.g., asking municipally owned companies, we found that German

municipalities do not have a direct influence on changes in *Tourism*, *Retail*, *Economy*, and *Mobility* during the pandemic. Due to their public administrative structures, some municipalities have only an indirect influence on the fields of action, but they are responsible for monitoring and implementing measures.

Table 3. Number of Covid-19-related changes per field of action

		Adm	Eco	Edu	Hea	Mob	Peo	Ret	Tou	from
	I	12	4	7	1	1	5	2	5	12
Phase	II	9	2	3	3	8	5	2	2	9
	III	12	6	11	12	4	7	9	7	12
Changes' Mean		100%	35%	61%	47%	44%	52%	38%	41%	
Ranking		1	8	2	4	5	3	7	6	

For the analysis of our case study, we concentrate on the four mentioned field of actions with the most measures – *Administration*, *Education*, *People* and *Health*. Thus, we are presenting in the following our findings from the interviews.

Changes in Administration. In the field of *Administration* one of the most common changes, which occurred due to Covid-19, was the introduction of remote work for municipal employees. This happened in all three phases: in Phase I to make it possible for employees to work at home, in Phase II to establish it, and in Phase III to consolidate it. At the beginning of Phase I, regarding data security standards as well as administrative regulations, the opportunity for municipal employees to work remotely was rare [43]. Especially in the case sample from Phase I and III only some employees and managers were able to work remotely because of different challenges, such as lack of IT equipment (laptop, webcam), digital data storage, or data. This changed with the outbreak of the pandemic as one CDO explains:

"Due to Covid-19 we relocated our employees in remote work opportunities. In the Administration, an average of 40% of our employees were working from home every day. Previously, remote work was only possible in individual cases." (M8)

With Covid-19, flexibility in terms of working hours, work location, and work technology gained importance and set new standards for "new work" in public administrations.

Another aspect noted by the participants was the basic equipment needed to be able to work remotely. Here, there were many structural changes in the municipalities. Hardware and software were upgraded, and new equipment was purchased, like notebooks, video conference tools, or Virtual Private Network (VPN) accesses.

"We needed new software and hardware to practice video conferences. Here again, we tried different tools for our conference procedures. […] In order to get external access regarding our data we also needed to improve our VPN area." (M4)

From Phase II onwards, the short-term regulations introduced in Phase I were consolidated and further expanded. "Fixed" remote times from 6 a.m. to 7 p.m. were introduced in many municipalities. In addition, the remote work rules were written down for the first time and a permanent employees' entitlement was approved.

Another measure was the introduction of online seminars or webinars to build employees competencies. Webinars combine many advantages: travel time is saved,

they are usually shorter, and contain more condensed knowledge. The webinars attended mainly addressed digital alternatives for common processes or subject-specific and method-specific content, like new work.

"*We started online seminars for employees to introduce them into digital processes in our administration*" (M9)

"*We noticed quickly that we have to build digital competences among our stuff. Otherwise, remote work and working at home will not run during the lockdown and beyond.*" (M2)

Since Phase III, another aspect has been added. Municipalities now also hold their internal meetings via video conferencing, e.g., meetings with elections, as solutions have also been found for this and it is considered practical.

"*Since politicians discovered that it is much easier to hold evening meetings including elections from home, we just do it. No counting ballots is so great.*" (M15)

Overall, municipal employees feel that the trends of flexibility in public administration are urgently needed and a right step into the future. They would like to see the changes carried over into many of the parts of the public administration, such as M2, M5, M13, M20.

Changes in Education. The second most important field of action where the municipalities had to react quickly was *Education*. At the beginning of Phase I, the municipalities analyzed how they can support the schools and pupils in homeschooling, e.g., with technical infrastructure.

"*During the pandemic, our council made decision about WLAN and school technology.*" (M4)

"*We have provided the schools with tablets.*" (M12)

"*We increased the hardware equipment for schools during the lockdown.*" (M6)

To decide more openly and transparent on the digital measures in *Education*, especially for schools, the district decided to build an intercommunal team to support schools during Covid-19 and beyond.

"*We introduced the "Intercommunal Working group on the Digitalization of Schools" to help schools with the digital measures because of the Covid-19 lockdown, everything had to happen quickly.*" (M1)

In Phase II, the participants noted that homeschooling only works partially well, and that further training is needed at teachers, parents, and pupils' side to train digital skills and spread digital attitudes.

"*We noticed that some parents are not able to support their children with homeschooling, and some teachers couldn't work with mobile technologies. This is where we noticed, we must teach every side about technology and their handling.*" (M7)

Finally, in Phase III, the extended lockdown has once again resulted in many changes. Digital learning projects with university support have emerged in schools, where they are evaluating which concept works best for which age group. A lot of hardware was purchased to support socially disadvantaged families and to offer learning platforms.

"*We were able to buy tablets for the teachers at all schools in our city so that they have a uniform system and can now communicate with all pupils. We have also adapted*

the training courses to these tablets, and we are now able to take the older colleagues with us." (M8)

Changes in People. When Covid-19 began and municipalities had to close their town halls, they still had to stay in touch with their citizens. To inform citizens about daily work, changes in administrative procedures, or about Covid-19, most municipalities used new technologies such as social media. This can be seen in all three phases, from the beginning of the pandemic to the present. In Phase I, increased information about the virus itself was shared with citizens as they were very unaware.

"We sent comprehensive information about Covid-19 via social media. This is, how we updated our citizens with daily statistics and new information." (M1)

In Phase II, information was increasingly shared on new online events for more outreach and networking.

"We use social media to increasingly highlight and inform about online events. In this way, we offer our citizens the opportunity to get in touch with other people and to network." (M17)

"In a time of distance, contact with other people is more important than ever. And even if virtual networking is difficult, it's necessary." (M14)

In Phase III, the information was expanded to new online concepts and opportunities at pandemic times.

"For the next summer vacations, we are developing a digital summer program for children." (M9)

"We have offered virtual city tours to our citizens to bring a bit of normality and distraction during this difficult time." (M10)

But new concepts are also increasingly being developed and information provided on how such events can be held again in presence and what needs to be considered.

"We are currently developing new opening concepts in areas such as sports and swimming pools, with digital registration, etc., to bring in some normality." (M11)

In addition, many municipalities have revised their homepages and made them more modern and transparent for their citizens, so that they can be informed easier and faster about Covid-19 regulations, even if the citizens do not have social media.

"In the course of the Corona we have revised and updated our own homepage so that we can reach many more people even those who do not use social media." (M7)

Since Phase II another project, pointed out by the municipalities, is the use of online tools and technology to keep citizens in touch with each other.

"We started to provide digital communication channels for citizens to stay in touch with their families and friends. This worked very well during the Covid-19 lockdown both for the older and younger ones." (M7)

And many new campaigns have been developed to fight against Covid-19 together.

"During Covid-19 lockdown we introduced the campaign #BeatCorona. The campaign aims to provide personalized and charitable help for its neighborhoods to leave no one behind during lockdown." (M16)

The projects during Covid-19 in this field of action show another important aspect. Small acts of kindness and especially neighborly help are more important than ever, especially in pandemic times. Additionally, in countries like Germany that is affected

by demographic change, social media is a useful tool for cities to organize citizens to help each other.

"For the seniors in the village were distributed Christmas and Easter gifts, which were made by kindergarten children. Small gifts in the form of handicrafts, snacks and games were also distributed for children and young people." (M19)

Changes in Health. Our findings show that the topic of *Health* did not receive much attention before Covid-19 and the municipalities initially focused on other areas, such *Administration*. At the start of Phase I, only one of the twelve municipalities addressed the issue of *Health*, and, in this regard, they only shared information about the virus with their citizens via their social media.

"We have shared comprehensive information and daily statistics on the Corona situation through our social media." (M1)

In Phase II not only general information about the virus was shared but possible solutions on how to fight the virus and what should be done.

"We need clear and structured hygiene concepts that can be implemented across the board." (M13)

"Solutions are needed for vaccinations and the necessary structures to implement them as quickly as possible." (M14)

In Phase III, changes in the field of *Health* can now be observed by all. All participants reported that hygiene concepts now exist and were embedded in existing structures. In addition, many participants reported that the municipalities have set up several Covid-19 testing-stations (like M18) and the citizens now have numerous opportunities to be tested.

"A solid hygiene concept was developed and introduced across the city." (M5)

Health has become significantly more relevant compared to Phase I, especially as municipalities independently declare their willingness to establish a vaccination center in the city (like M2, M13, or M18).

"The first vaccinations in our nursing homes, both for citizens and staff have already been taken place. Staff in our clinics have also already been vaccinated, and since March, kindergarten staff and teachers have also been vaccinated." (M21)

In addition to the many solutions and measures to fight the virus, some municipalities have also found that due to the contact restrictions, for more than a year, there is an urgently need to offer new sports and especially outdoor activities that can be carried out under all restrictions for citizens.

"Sports and outdoor activities are increasing in importance. For this, many more offers with thoughtful concepts must be developed and offered." (M3)

"We have expanded the existing digital fitness offerings with our adult education center" (M11)

5   Discussion

This case study is motivated by the Covid-19 related municipal changes. Due to the pandemic, municipalities were forced to respond quickly to challenges and accelerate digital transformation projects that were planned for a longer period. With this case

study, we contribute to a better understanding, both theoretical and practical, of the Covid-19 related challenges and changes in public administrations. Compared to the normal planned digital transformations, we found changes that firstly started at a certain phase and secondly changed constantly. We will start with the changes that became visible only from a certain phase.

Municipalities started to share information about Covid-19 itself, the new regulations, and restrictions through social media channels from Phase I onwards. Later, about the vaccination offer as well. This was visible in both *People* and *Health*. Here, it became apparent that their digital transformation led to an intensification of use, which was not foreseen in the pre-Covid-19 concept. From Phase II onwards, the municipalities increasingly made use of help from external organizations (e.g., companies, universities, or associations). This was partly because their services were not available in Phase I and partly because the municipalities did not know exactly what they needed in Phase I. The external help was accepted in *Education* and *Health*. In this case, partners were also planned for the digital transformation in the pre-Covid concept, but not as many and at such an early stage. From Phase III onward, two changes came into sharp focus. Firstly, the development and formation of digital competences, and secondly, the internal municipal meetings were held digitally using a video conferencing tool. This was for similar reasons, because Phase II also marked the end of the strict lockdown and public administrations in Germany returned to work in the town hall. In Phase III, however, a lockdown was imposed again, and employees had to work remotely again. This led many mayors and municipal team leaders to train their employees and their digital competences as well as to fully transform internal municipal meetings into digital. This occurred mainly in *Administration*, but also in *Education* in terms of training teachers and pupils. Compared to pre-Covid, training for digital competences was foreseen, but full digital meetings were not considered.

In parallel, there were also constant changes across the phases. These include, for example, working remotely, increasing flexibility, information intensity via Covid-19, support for schools, and the acquisition of IT equipment. In the case of remote working, the first steps were taken in Phase I to make remote working possible in the first place. In Phase II, fixed regulations were introduced and from Phase III onwards, remote working was fully accepted and obstacles such as files, which were now digitized, were removed. Another example is the IT equipment that was continuously built up. In Phase I, many suppliers did not have access to laptops which resulted in bottlenecks. In Phase II, this was overcome, and many computers were replaced by laptops. In Phase III, the laptops were rolled out further and the software was also rolled out across the board. The aforementioned continuous changes occurred in all of the fields of action examined. Compared to the pre-Covid concept, it is very noticeable that some of the changes were definitely planned for. However, time and quantity had never been planned for in this way. The situation is different for the changes in schools and the dissemination of information. These changes were not included in the pre-Covid concept. However, the pandemic has shown that even unexpected areas urgently need municipal support for digital transformation. Therefore, an important finding of this case study is now to review all areas of municipal action and to see whether these areas have needed or still need support over the course of the last year and a half.

References

1. Chronik zum Coronavirus SARS-CoV-2, https://www.bundesgesundheitsministerium.de/coronavirus/chronik-coronavirus.html, last accessed 2021/05/12.

2. Herath, T., Herath, H.S.B.: Coping with the new normal imposed by the COVID-19 Pandemic: lessons for technology management and governance. Information Systems Management. 37, 277–283 (2020).

3. Alshammari, T., Messom, C., Cheung, Y.: Citizens' Adoption of Digital Technologies during COVID-19. ICEB 2020 Proceedings (Hong Kong, SAR China). (2020).

4. Schomaker, R.M., Bauer, M.W.: What Drives Successful Administrative Performance during Crises? Lessons from Refugee Migration and the Covid-19 Pandemic. Public Administration Review. 80, 845–850 (2020). https://doi.org/10.1111/puar.13280.

5. Amankwah-Amoah, J., Khan, Z., Wood, G., Knight, G.: COVID-19 and digitalization: The great acceleration. Journal of Business Research. 136, 602–611 (2021). https://doi.org/10.1016/j.jbusres.2021.08.011.

6. Ito, N.C., Pongeluppe, L.S.: The COVID-19 outbreak and the municipal administration responses: resource munificence, social vulnerability, and the effectiveness of public actions. (2020). https://doi.org/10.1590/0034-761220200249x.

7. Gabryelczyk, R.: Has COVID-19 accelerated digital transformation? Initial lessons learned for public administrations. Information Systems Management. 37, 303–309 (2020). https://doi.org/10.1080/10580530.2020.1820633.

8. Anttiroiko, A.-V.: Successful Government Responses to the Pandemic: Contextualizing National and Urban Responses to the COVID-19 Outbreak in East and West. https://services.igi-global.com/resolvedoi/resolve.aspx?doi=10.4018/IJEPR.20210401.oa1. (2021).

9. Dunlop, C.A., Ongaro, E., Baker, K.: Researching COVID-19: A research agenda for public policy and administration scholars. Public Policy and Administration. 35, 365–383 (2020). https://doi.org/10.1177/0952076720939631.

10. Boin, A., Brock, K., Craft, J., Halligan, J., 't Hart, P., Roy, J., Tellier, G., Turnbull, L.: Beyond COVID-19: Five commentaries on expert knowledge, executive action, and accountability in governance and public administration. Can. Public Admin. 63, 339–368 (2020). https://doi.org/10.1111/capa.12386.

11. Mazzucato, M., Kattel, R.: COVID-19 and public-sector capacity. Oxford Review of Economic Policy. 36, S256–S269 (2020). https://doi.org/10.1093/oxrep/graa031.

12. Sanchez-Graells, A.: Procurement in the Time of COVID-19. SSRN Journal. (2020). https://doi.org/10.2139/ssrn.3570154.

13. McKinsey & Company: How COVID-19 has pushed companies over the technology tipping point—and transformed business forever, http://ceros.mckinsey.com/coronavirus-promo-video-desktop, last accessed 2021/08/20.

14. Next:Public GmbH: Verwaltung in Krisenzeiten - Eine Bestandsaufnahme der Auswirkungen der Corona-Pandemie auf den öffentlichen Dienst, (2020).

15. Agostino, D., Arnaboldi, M., Lema, M.D.: New development: COVID-19 as an accelerator of digital transformation in public service delivery. Public Money & Management. 41, 69–72 (2021). https://doi.org/10.1080/09540962.2020.1764206.

16.   Corona-Pandemie beschleunigt Digitalisierung der Verwaltung | Bitkom e.V., https://www.bitkom.org/Presse/Presseinformation/Corona-Pandemie-beschleunigt-Digitalisierung-der-Verwaltung, last accessed 2021/08/27.

17.   Ansell, C., Sørensen, E., Torfing, J.: The COVID-19 pandemic as a game changer for public administration and leadership? The need for robust governance responses to turbulent problems. Public Management Review. 23, 1–12 (2020). https://doi.org/10.1080/14719037.2020.1820272.

18.   Faro, B., Abedin, B., Kozanoglu, D.C.: Continuous transformation of public sector organisations in the digital era. AMCIS 2019 Proceedings. 5 (2019).

19.   Plesner, U., Justesen, L., Glerup, C.: The transformation of work in digitized public sector organizations. Journal of Organizational Change Management. 31, 1176–1190 (2018). https://doi.org/10.1108/JOCM-06-2017-0257.

20.   Giffinger, R., Gudrun, H., Gudrun, Haindlmaier, G.: Smart cities ranking: An effective instrument for the positioning of the cities. ACE: Architecture, City and Environment. 4, (2010).

21.   Lombardi, P., Giordano, S., Farouh, H., Yousef, W.: Modelling the smart city performance. Innovation: The European Journal of Social Science Research. 25, 137–149 (2012). https://doi.org/10.1080/13511610.2012.660325.

22.   van Winden, W., De, L., Carvalho, L.: How digitalization changes cities: innovation for the urban economy of tomorrow. (2017). https://doi.org/10.13140/RG.2.2.27447.83362.

23.   Albino, V., Berardi, U., Dangelico, R.M.: Smart cities: Definitions, dimensions, performance, and initiatives. Journal of Urban Technology. 22, 1–19 (2015). https://doi.org/10.1080/10630732.2014.942092.

24.   Kirimtat, A., Krejcar, O., Kertesz, A., Tasgetiren, M.F.: Future trends and current state of smart city concepts: A survey. IEEE Access. 8, 86448–86467 (2020). https://doi.org/10.1109/ACCESS.2020.2992441.

25.   Lai, C.S., Jia, Y., Dong, Z., Wang, D., Tao, Y., Lai, Q.H., Wong, R.T.K., Zobaa, A.F., Wu, R., Lai, L.L.: A Review of Technical Standards for Smart Cities. Clean Technologies. 2, 290–310 (2020). https://doi.org/10.3390/cleantechnol2030019.

26.   Schaefer, C.: Developing a smart city strategy by use of St. Gallen management model focused in smart mobility and smart environment. Presented at the Get Togheter - Think Togheter , Siegen (2020). https://doi.org/10.25819.

27.   European Comission: Strengthening the competitiveness of the European retail sector. , Brussels (2018).

28.   Pantano, E., Timmermans, H.: What is smart for retailing? Procedia Environmental Sciences. 22, 101–107 (2014). https://doi.org/10.1016/j.proenv.2014.11.010.

29.   Handelsverband Deutschland: Der Einzelhandel in der Corona Krise. , Berlin (2020).

30.   Lee, P., Hunter, W.C., Chung, N.: Smart tourism city: Developments and transformations. Sustainability. 12, 3958 (2020). https://doi.org/10.3390/su12103958.

31.   Miles, M.B., Huberman, A.M.: Qualitative data analysis: An expanded sourcebook. sage (1994).

32.   Yin, R.K.: Validity and generalization in future case study evaluations. Evaluation. 19, 321–332 (2013).

33.   Benbasat, I., Goldstein, D.K., Mead, M.: The Case Research Strategy in Studies of Information Systems. MIS Quarterly. 11, 369–386 (1987). https://doi.org/10.2307/248684.

34.   Keutel, M., Michalik, B., Richter, J.: Towards mindful case study research in IS: a

critical analysis of the past ten years. European Journal of Information Systems. 23, 256–272 (2014). https://doi.org/10.1057/ejis.2013.26.

35.   Klesel, M., Lemmer, K., Bretschneider, U., Niehaves, B.: Transgressive Use of Technology. International Conference on Information Systems. 1–15 (2017).

36.   Patton, M.Q.: Qualitative Research. Wiley Online Library (2005).

37.   Eisenhardt, K.M.: Building Theories from Case Study Research. Academy of Management Review. 14, 532–550 (1989).

38.   Deese, J., Kaufman, R.A.: Serial effects in recall of unorganized and sequentially organized verbal material. Journal of Experimental Psychology. 54, 180–187 (1957). https://doi.org/10.1037/h0040536.

39.   Pumplun, L., Tauchert, C., Heidt, M.: A New Organizational Chassis for Artificial Intelligence-Exploring Organizational Readiness Factors. In: Proceedings of the Twenty-Seventh European Conference on Information Systems (ECIS2019). pp. 1–15 (2019).

40.   Sarker, S., Xiao, X., Beaulieu, T.: Guest editorial: qualitative studies in information systems: a critical review and some guiding principles. MIS quarterly. 37, iii–xviii (2013).

41.   Darke, P., Shanks, G., Broadbent, M.: Successfully completing case study research: combining rigour, relevance and pragmatism. Information Systems Journal. 8, 273–289 (1998). https://doi.org/10.1046/j.1365-2575.1998.00040.x.

42.   Corbin, J., Strauss, A.: Basics of qualitative research: Techniques and procedures for developing grounded theory. Sage publications (2014).

43.   Klesel, M., Kampling, H., Bretschneider, U., Niehaves, B.: Does the Ability to Choose Matter? On the Relationship between Bring Your Own Behavior and IT Satisfaction. Communications of the Association for Information Systems. 43, 690–710 (2018). https://doi.org/10.17705/1CAIS.04336.