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*Infrastructuring for Organizational Resilience:*
*A workshop report*

**Guest Editors**:

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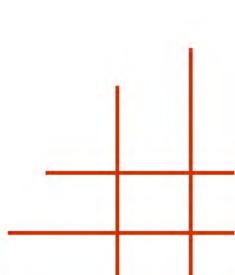Marén Schorch


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# Table contents

# Impressum

# Infrastructuring for organizational resilience: A Workshop Report

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**Abstract.** A significant amount of research has been done in Computer-Supported Cooperative Work (CSCW) to understand the underpinnings of work infrastructures and the phenomena of infrastructuring. These elucidations have helped understand the ontological relativism of soft and hard infrastructures and used the analytical lens of infrastructuring to understand the development and emergence of infrastructures and technological interventions. In science and technology studies, infrastructures are considered inherently robust with momentum and scaling mechanisms for self-correction and continuity. Our two-day workshop at the European Conference on CSCW in 2021 focused on exploring the notion of infrastructures in the broader context of organizational resilience (continuity) and in times of crisis (Covid19 pandemic, floods etc.). In the workshop, we set up a broader research scope ranging from smaller and medium enterprises to public administration domains enlightening the need for rigorous research for developing robust, flexible, and adaptable infrastructures as a manifestation of resilient infrastructures.

## 1   Introduction

Organizational infrastructures characterize the very fabric of an organization. These overlapping layers of different work and technology infrastructures facilitate various faculties of work/business; they are crucial for continuity in operations (Holsapple and Luo 1996). Science and technology studies (STS) consider infrastructures inherently robust with momentum and scaling mechanisms for self-correction and evolution (Hanseth and Lundberg 2001). However, the obstructions

caused by various crises in the last decade and especially the ongoing Covid-19 pandemic have challenged the organizational infrastructures. It also highlighted many limitations in organizational resilience, limiting organizational infrastructures to be from partially dysfunctional to completely non-operational (Syed et al. 2021). A robust organization performs in a state with a well-defined "normal". Still, a resilient one, functions in a different state of flexibility, adaptability, and elasticity, allowing the system to retain its core functions and service delivery by switching into a "new normal" during a crisis (Dahlberg and Guay 2015). Following Weick and Sutcliffe (2007), Kette and Vollmer (2015) describe two options how organizations can cope with or learn from crisis: On the one side, by a "normalization of disasters" (in the sense of reflecting on causes, responsibilities, the effectiveness of decisions etc. and transforming "ill-structured" problems into "well-structured" problems on a more formal level); on the other side, by more implicit and idiosyncratic learning processes within the organization, in which "learning is contained within small circuits of organizational practice and is much harder to spot from beyond these circuits" (Kette und Vollmer 2015: 181). Such forms of organizational learning during or after a crisis are also essential for building up resilience for future crises (ibidem, Egner and Schorch 2015).

Despite being agile and flexible, numerous business organizations, especially small and medium enterprises (SMEs), may need to become more strategically driven in their approach to managing threats and extreme events (Sullivan-Taylor and Branicki 2011). This ideology of organizational transformation is aligned with the expectations calibrated in infrastructures research by Karasti and Blomberg (Karasti and Blomberg 2018). The authors developed new concepts to help understand the workplace and organizational infrastructures in complex, widely distributed, temporally expanded, and large-scale settings. These settings are analogous to the challenges imposed on business organizations in emergent scenarios or recent times with an ongoing pandemic, multiple phases and forms of contact restrictions, lockdowns, and further limitations. Business organizations are always exposed to numerous threats that can snowball into crises or catastrophes. The ongoing COVID-19 pandemic has further escalated business concerns by altering daily routines and work practices worldwide, ultimately disrupting how organizations conduct business. The lack of adequate preparation and resources jeopardize organizational sustainability and individual welfare, exposing them to threats and making them vulnerable (Barnett and Pratt 2000, Deverell 2010). Especially notable is the SME sector, which is extremely vulnerable in times of crisis and is often the least resilient of all the organizational sectors (Bingunath et al. 2008).

According to Star and collaborators, infrastructures have a spatial and temporal reach and scope, are embedded in other social and technological structures, shape and are shaped by conventions of practice, and, most notably, are invisible and become visible upon breakdown (Star and Bowker 2018, Star and Ruhleder 1994).

These intrinsic peculiarities of an infrastructure substantiate several aspects of an organization. Simultaneously, the notion of breakdown is inclined to the idea of disruption and change in organizations, strengthening the argument for improved organizational resilience. Holling (1973) introduced the term 'resilience' from an ecological context, and since then, it has been applied to various contexts and application domains (Holling 1973). The organizational point of view holds the idea of resilience, signifying its application to both individual and organizational responses to disturbances and threats (Burnard and Bhamra 2011).

Organizational infrastructures are needed to be explored from the viewpoint of disruption or change (Soden and Palen 2016, Wiedenhöfer et al. 2011). Infrastructures remain transparent (and mostly invisible) once established, "reappearing" only at moments of upheaval or breakdown (Jackson et al. 2007, Pipek and Wulf 2009, Star and Bowker 2018). This is also called the point of infrastructure. However, when a point of infrastructure is reached due to disruption or breakdown, it temporarily generates a stronger implicit tie between the activity spheres, causing the infrastructure to illustrate an apparent resonating change in a stronger sense of urgency for infrastructure improvements (Ludwig et al. 2018). These churns fixtures and infrastructure developments against disruption ensure continuity and flexibility in the activity sphere. This ability to adapt and emerge indoctrinate action qualities in infrastructures also called *infrastructuring*. It echoes with the inherent traits of organizational resilience like coping strategy and adaptive capacity to respond to change, disruption, or breakdown (Hollnagel 2011, McManus et al. 2008, Kette and Vollmer 2015, Soden and Palen 2016). Many infrastructuring processes and phenomena emerge from the installed base (from what is already there). They are strongly influenced by the network of existing dependencies (Karasti et al. 2010, 2018, Karasti and Blomberg 2018). The manifestations of organizational resilience and infrastructures have overlaps and present unbound research opportunities to develop robust, flexible, and adaptive infrastructures. The workshop aimed at building a richer understanding of issues related to the analysis and design of resilient infrastructures with the following agendas:

1. bringing the discussion on organizational resilience under the umbrella of CSCW to explore the potentials of collaboration and cooperative work in organizational infrastructures,
2. discussing salient features of organizational infrastructures concerning resilience theories and
3. collecting the issues, theories, and methods to improve organizational infrastructures that make them self-adjusting and evolving networks of activities, knowledge, tools, services, etc.

# 2 Pre-Workshop and Workshop Developments

The workshop attracted 16 researchers from diverse disciplines such as human-computer interaction, management and business studies, public administration, sociology and media sciences. The variety of topics discussed in the context of resilient infrastructures is reflected in the extended position papers collected in this workshop report. Five position papers are presented in detail, keeping in view the stretch and bounds and the relevance of the topics with the core subject at the workshop:

(1) In the first position paper, "Infrastructuring Resilience through Collective Mind: Opportunity for SMEs", Diogo Cotta proposes the idea of an emergent cognitive state, a collective organizational mind for infrastructuring resilience, which arises through the interactions among organizational actors involved in routine process adjustment.

(2) Michael Ahmadi and Sebastian Taugerbeck then shift the focus to "Home Office and Resilience Strategies – Lessons Learned from Our Research" to the case of crystallized infrastructures due to breakdown because of a collective crisis, i.e., the Covid-19 pandemic, which exposed the deficits in the existing organizational infrastructures and expect the current developments to provide profound insights into how ICT can help build resilient infrastructures.

(3) The third contribution, by Noor Nazrabi, explores "Strengthening Resilience with Agile Business Models and Strategy during Crisis Management" and demonstrates how the agility and strategic crisis management in business models can instill resilience in the overall organizational infrastructures.

(4) Ann-Marie Nienaber, Andree Woodcock and Kat Gut also emphasize the significance of agility and flexibility for resilience in the organizational infrastructures of local authorities in their paper "Agility and Resilience of Local Authorities – the Covid challenge". They present the insights and experiences from a cross-national project on Supporting Urban Integrated Transport Systems (SUITS), affirming authorities' learning and capacity building for agile and resilient infrastructures.

(5) In the last contribution, Nico Vitt and Marc Gerbracht reflect on "Doing research with SMEs: Participation, voluntariness and the role of the researcher". Here, vital questions about the employee's participation and voluntariness in participatory research and how much the organizational infrastructure is disrupted due to the presence of a researcher are discussed.

Some of the key terminology and related issues collected collaboratively with the participants as a background for the workshop can be seen in Figure 1:
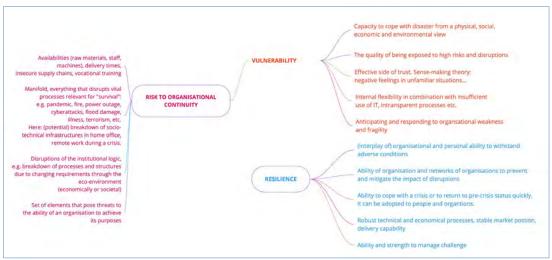
**Figure 1: Concept mind map 1 (created with miro®)**

The position papers were collected and disseminated before the workshop. Before the workshop, while assessing the different cases presented in the position papers, it became clearer for the organizers that we were going towards a very multi-disciplinary discussion. So, to establish some grounds for discussion, a form-based closed interview was done with the participants to generate some collective insight into the different concepts which were to be discussed and repeated during the workshop. The concepts included understanding infrastructures, organization, resilience, vulnerability, and risks to organizational continuity. The participants were also asked about their target infrastructure and organization for discussion, the expectations of the workshop and further topics if they wanted to connect with the recent body of concepts. The results from the interviews were also made available to the group as concept mind maps using collaborative Miro® space. A snippet of such concept mind maps is shown in figure 1.

This exercise was very productive as it spawned a collective understanding of the concepts among a diversified group of researchers. Besides the positive papers, the schedule, collective concepts and an introduction to the online collaborative platform Miro® were relayed to the participants before the workshop. Due to the pandemic restrictions, the workshop was completely online but split into two days. The workshop was planned in a way that the first day could be exploited to fashion familiarity with the agenda of the workshop and the presented case studies so that the second day can be more goal-oriented and focused on the mutual creation of knowledge for the subject of resilient infrastructures and the notion of infrastructuring resilience. This was necessary to address the multidisciplinary diversity in the group and keep the online workshop format less cumbersome and as playful as possible. The schedule of the two-day online workshop is presented in figure 2.
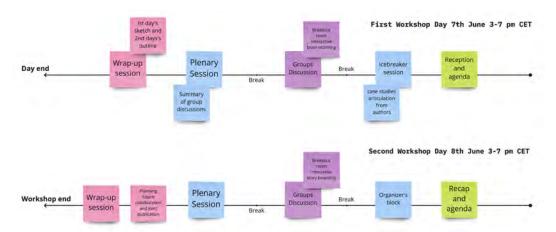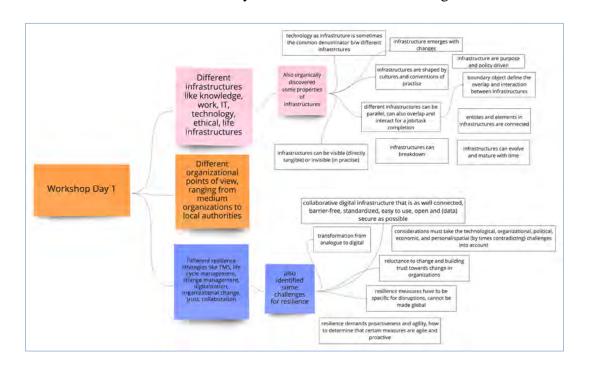
**Figure 2: Two-day schedule of the workshop (created with miro®)**

The workshop started with a formal reception from the organizers and put forward the plan and schedule for both workshop days. The first workshop session was called the 'icebreaker', where all the position papers were articulated by their authors, followed by some questions about the respective case studies. This allowed the participants to look beyond their perspectives and understandings of the individual cases and some synergies started to formulate, which led to our next session, 'group discussion'. The participants were divided into three working groups (breakout sessions) with 5-6 participants each, which were assigned two case studies to be discussed further but now in a manner to draw interesting themes, commonalities, questions, and insights as per the overall plan of the workshop towards infrastructuring for organizational resilience. The groups disbanded and met again to present their collaborative findings from the case studies under discussion and the implications for the workshop topic. This concluded the first day of the workshop, with the organizers reporting the discussion sketch of the first day and the 2nd day's outline.

We started the second day with a quick recap of the last day's proceedings and informed the participants about the plan for today. As the first day of the workshop was more concentrated on building a familiarity about the use cases and the underline phenomenon of infrastructuring resilience so, we decided to start the second day with a more formal introduction to the concepts of infrastructures and infrastructure from the perspectives of science and technology studies (STS) and socio-informatics (SI). This was necessary to bring the participants to comparable levels of understanding of the underline concepts because of the group diversity and the conceptual differentiation seen in the pre-survey; it was quite evident that different interpretations and understandings of the concepts exist within the group. We were extremely fortunate to have Helena Karasti as one of the organizers, an accomplished researcher and an expert in the field of infrastructures and infrastructuring. She has many years of research experience with the baseline topic of the workshop, with many outstanding publications on the subject matter. We

initiated the formal discussion on the second day by conducting a dialogue on the infrastructures and infrastructuring from STS and SI perspectives with Helena in the 'organizers block' to streamline the horizon of discussion among the participants.

After the 'organizers block', the participants were given a chance again to discuss and collaboratively draw implications for resilient infrastructures using the Star and co.'s characteristics of infrastructure (Star and Bowker 2018, Star and Ruhleder 1994) and the notion of infrastructuring by Pipek and Wulf (Pipek and Wulf 2009). The first day's discussion was more situated towards analyzing the resilience measures in the respective organizations from case studies, thinking about the infrastructures in those organizations, and assessing if the infrastructures had the adaptive capacities to undergo changes caused by unknown events. A summarized view of the first day's discussion can be seen in figure 3.



However, after formalizing the concept of infrastructures and infrastructuring in the 'organizers block', a frame of reference was achieved to analyze the workshop's underline problem statement, i.e., how to infrastructure resilience in organizations? The participants transcended the locales of their use cases and started discussing with generalization using infrastructuring as a relational phenomenon to assist change in organizations. These discussions happened again in breakout groups fashion, followed by a 'plenary session' to share the findings with the whole group of participants at the workshop. After each group shared their respective findings and the participants were able to draw synergies among the created knowledge and

the problem statement, the organizers concluded the workshop with plans for further collaboration.

# 3   Workshop Takeaways and Results

The key takeaways from the discussion on both days are as follows:

1. Infrastructures are all intersections of social, technological, ethical and political values. Collaborative digital infrastructure should be well connected, barrier-free, standardized, easy to use, open and data secured as much as possible. These things can already be there in organizations and should be running (continues) to build up the resilience in the organization.
2. The technological infrastructure is a common denominator between infrastructures within an organization among the discussed infrastructures at the workshop. The organizational culture and the convention of different organizations formulate or shape the infrastructure they will create or use. It, however, emerges with change and are policy and purpose-driven.
3. Infrastructure is not just technology, but also needs to take into account sociological and social-technical issues. One of such aspects is the importance of trust, trust in people (actors in infrastructures), the technology and their interplay. Behavioral change and technological change work hand in hand in this matter. Building up and maintaining trust are therefore key strategies for resilience in businesses.
4. Knowledge is crucial to resilience. So, technology can help rethink how we make knowledge accessible in these systems or within these infrastructures. Due to this is knowledge accessibility, we deal with small crises or glitches where we don't work in plans but have typically situated actions, which is inclined with the notion of infrastructuring.
5. Resilient infrastructures require knowledge about how these infrastructures crystalize or when might they break down, but also: when do they emerge, how they are connected, and the boundary objects.
6. In one infrastructure, some entities and elements are connected via relational connections. Infrastructure can evolve and mature with time. One thing that all groups agreed upon was that infrastructure could break down and become partially dysfunctional, or they cannot do their jobs. It was also reinstated that infrastructure can be directly visible, tangible or invisible like submerged in practice.
7. Different levels of infrastructures apart from invisible and visible infrastructure were also considered, like changes between active and passive that people directly infuse in the organization or by society or technology.
8. Moral or ethical infrastructure is the underlying premise moderating the change between analogue and digital work to evolve. Digital infrastructure does not

change as much as knowledge infrastructure. The requirement is to look at resistance to change and moderate that. So, what are the necessities of the people, values, beliefs, ethics matter a lot in the long term on how knowledge infrastructure will evolve and how it will affect the technological infrastructure in an organization.

9. No one fits all resilient infrastructure! Resilience measures have to be specific for disruptions; therefore, organizations have to look at their environment and focus on what they depend on to ensure they understand the resilience bases well. Resilience demands proactiveness and agility, and the need is to figure out how to determine that certain measures are agile and proactive.

10. Resilience is a dimension of infrastructures hidden in other dimensions (Star and Bowker 2018, Star and Ruhleder 1994) but never articulated because it is assumed that when a change happens, the whole infrastructure machinery becomes alive and fix it until it submerges again in practice. But, when the lens of crisis is used due to temporal, spatial and organizational cruciality, it becomes vital to elaborate the infrastructuring activities required to make an infrastructure resilient.

# 4 Acknowledgements

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# Infrastructuring Resilience through Collective Mind: Opportunity for SMEs

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**Abstract.** Every organization has to cope with the need to deviate from what is planned or expected in response to disruptive events. Hence, every organization requires a resilience infrastructure that supports the design and implementation of adjustments to routine operational processes in response to such events. Traditionally, understandings of resilience infrastructures have been focused on the maintenance of redundant resources and the introduction of flexibility in work processes. However, when disruptive events pose ill-defined problems, organizations require a cognitive resilience infrastructure to support sharing concepts, facts, and experiences among different organizational actors, so that process adjustments are as effective as possible in minimizing performance impacts. As an emergent cognitive state, a collective organizational mind for resilience arises through the interactions among organizational actors involved in routine process adjustment. It enables the design and implementation of adjustments to minimize performance impacts effectively. A collective mind for resilience is particularly useful in resource-constrained organizations, such as SMEs.

## 1  Introduction

In spite of managers' best efforts, every organization has to cope with the need to deviate from what is planned or expected. Examples of disruptive events that trigger the need to adjust routine operational processes include factory accidents, part shortages, machine breakdowns, labor unrest, design errors, cyberattacks, demand surges, supplier bankruptcies, regulatory changes, political crises, pandemics or natural catastrophes (Hendricks and Singhal 2005, Kogh and Saad 2006, Scholten and Schilder 2015). Disruptive events hurt the functioning of organizations because they render routine processes obsolete or, at least, ineffective and put workflow continuity under pressure. It is thus not surprising that the occurrence of disruptions has been empirically shown to affect multiple dimensions in which organizations are expected to perform. In particular, disruptions increase costs (Rauniar et al. 2008), decrease operational reliability (Tenhiala and Salvador 2014), reduce shareholder value for public firms (Hendricks and Singhal 2003) and damage organizational reputation in general (Rao et al. 2011).

Even though disruptive events may vary in their likelihood of occurrence and potential organizational impact, ultimately, every organization is called to have or

to develop a resilience infrastructure that facilitates the operational handling of unexpected events. In other words, given the inevitability of unexpected events, organizations require foundations that support their ability to adjust routine processes and recover from the unexpected to ensure workflow continuity and minimize performance impacts. Traditionally, understandings of these foundations have been rooted in physical and technological ontologies, such that organizations are advised to maintain redundant resources and induce flexibility in their work processes (Sheffi 2019). Redundant resources such as idle personnel, underutilized machinery, backup suppliers, cash reserves, extra inventory of inputs and finished products, and unused distribution channels can be quickly mobilized to adjust routine processes once a disruption materializes. Process flexibility is induced by, for example, having cross-trained personnel, multipurpose machinery, design, manufacturing and service modularity, and versatile information systems. Flexible work processes increase the range of possible adjustments when responding to a materialized disruption.

Despite the demonstrable performance benefits of having redundant resources and work processes (Tang 2006, Tomlin 2008), their effectiveness is curtailed when disruptions introduce ill-defined problems (Polyviou et al. 2020). When there are multiple viable ways to respond and several practicable adjustments to routine processes, organizations require a resilience infrastructure that supports the sharing of concepts, facts and experiences among different organizational actors (Hoopes 2001). Such infrastructure should enable organizations to integrate knowledge from other relevant sources, so that implemented process adjustments are as effective as possible in minimizing performance impacts. To the extent that adjusting processes through flexibility or by using redundancies must be complemented by integrating available organizational knowledge, the foundations of resilience must also contain a cognitive dimension. Beyond the requisite physical and technological resilience infrastructure, organizations must rely on a cognitive infrastructure rooted in the complex interactions among the disparate organizational actors that weigh in on the execution of process adjustments.

# 2 Collective Mind

The idea that there is scholarly merit in studying collectives such as organizations as possessing cognitive properties has been explored by different streams in the social sciences. Economists and social psychologists investigate group rationality (Basu 1994). Management scholars study team and firm learning processes (Argote 2012). Sociologists and anthropologists examine group memory (Coser 1992). Organizations have a collective mind to process the information required to pursue their objectives. A collective organizational mind is an emergent cognitive state that arises through the interactions among interdependent organizational actors going about their work. It is emergent in the sense that its existence is not reducible to the

sum of individual actors' cognitions but also in the sense that it does not materialize by explicit design.

Collective mind in organizations is manifest when organizational actors share standard mental models about operational goals and means to pursue them. Although most organizations try to formalize significant steps of their routine processes, the complexity of manufacturing and service delivery systems generates high levels of knowledge interdependence among organizational actors (Ravendraan et al. 2020). As individuals spend time together, knowledge interdependence mandates collaborative practices that rely on distributed cognition to facilitate the situational coordination of physical, technological, and social resources. The role of the collective organizational mind is to connect the appropriate actors and integrate their expertise in meeting varied situational demands.

# 3 Infrastructuring Resilience through Collective Mind

Disruptions preclude the pursuit of routine operational processes and generate uncertainty about needed process adjustments. To reduce this uncertainty and implement effective adjustments, organizations can benefit from a collective mind that supports the acquisition, storage, sharing and integration of concepts, facts and experiences among different organizational actors. This collective mind should allow organizational actors to engage in the behaviors necessary to improvise the search, retrieval and integration of the expertise pertinent to each occurring disruption (Hansen 1999, Majchrzak et al. 2012). As organizational actors develop familiarity and awareness about each other, this collective mind should connect with increased efficiency past experiences with current (and future) knowledge requirements. Furthermore, this collective mind should process increasing amounts of facts as new information is made available through learning. Hence, process adjustments can benefit from this collective organizational mind to the extent that each particular disruption will call for a specific combination of expertise and knowledge integration methods (Faraj and Sproul 2000).

A collective mind lays the foundations for efficient and effective interactions among organizational actors holding expertise relevant for process adjustments and acts as a cognitive resilience infrastructure. A collective mind ensures the organization processes sufficient information before implementing process adjustments, but also that the organization learns from each disruption, thus continuously strengthening its resilience infrastructure. Acting to complement a physical and technical infrastructure, a collective organizational mind for resilience is mainly required when there are multiple feasible adjustments and a need for judgment and deliberation. In these circumstances, a resilience infrastructure must

ensure that available expertise is identified across functional boundaries and that communication barriers are reduced through standard vocabularies and understandings (Grant, 1996, Kogut and Zander 1996, Bechky 2003).

# 4 Collective Mind for Resilience in SMEs

Even if organizations of all shapes, sizes, and areas of activity can benefit from a cognitive resilience infrastructure, large firms tend to have more tangible and intangible resources to handle disruptions and minimize their performance impact. Access and ease of deployment of these resources enable large firms to invest in their psychical and technological resilience infrastructure, which helps them adjust routine operational processes with redundant resources and flexibility. Smaller organizations, conversely, are usually resource-constrained (Audretsch and Elston 2002) and have a more challenging time buffering performance. In effect, SMEs are typically unable to use financial slack to buy themselves out of disruptions-induced trouble or to use power to leverage relationships with partners and relevant environmental actors. These limitations mean that their resilience infrastructure must rely more on the ability to bring cognitive capacity to bear on the problems posed by disruptions. The development of a collective mind for resilience constitutes an excellent opportunity for resource-constrained organizations because it enables more efficient utilization of the knowledge capabilities already available internally and constitutes an inexpensive means to exploit and explore the expertise of organizational actors for collective benefit.

# 5 Workshop Participation

With my participation in this workshop, I aimed to explore opportunities to expand my research focus on resilience, a collective mind, and impromptu collaboration with research on information infrastructure and infrastructuring. In particular, I was interested in learning about alternative methods to study the emergence and connect more traditional management disciplines with the CSCW community. These goals were fundamentally achieved in that participants' presentations during the workshop offered me creative suggestions and manifested insightful interlinkages between my investigation of resilience grounded in management and other approaches.

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# Home Office and Resilience Strategies – Lessons Learned from Our Research

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**Abstract.** With lockdowns, contact bans, and the shared experience of this collective crisis, COVID-19 brought dramatic changes to social and economic life. An essential aspect in this context is the increased demand and the resulting shift from office work based on physical presence to home-office and remote work solutions. Many organizations, institutions, individuals, and households were not well prepared for these new circumstances, and in 2021 the situation remains messy, with a significant number of organizations refusing to allow their employees to work remotely, while others have gained valuable experience in running a decentralized business. Thus, we can expect current developments to provide profound insights into how ICT can help build resilient infrastructures. If companies embrace this change, they can offer their employees greater flexibility in work-life balance and job satisfaction, creating the company's best value. However, appropriate considerations must consider the technological, organizational, political, economic, and personal challenges.

## 1  Introduction

The COVID-19 pandemic has maneuvered us straight into an era of turmoil, and the impact of lockdowns, contact bans, as well as the shared experience of this collective crisis is already dramatically visible for social and economic life. Since the beginning, ICT has played a vital role in organizations reacting to the crisis and maintaining their business processes (e.g., Vaishya et al. 2020). A significant consequence is the increased demand and the resulting shift from onsite office work based on physical presence to remote or Home Office work. It is essential to consider that working from Home Offices in the pandemic is not necessarily a self-chosen option. Many organizations, institutions, individuals, and households were unprepared to react to this so-called "enforced working from home."

Come 2021, the situation remains messy, with a significant number of organizations denying their employees the possibility to work remotely. However, others have gained valuable experience on how to run a decentralized business. Thus, we can expect that the current developments will provide profound lessons learned on how ICT can support setting up resilient infrastructures. If companies embrace this change, they can offer their employees more flexibility regarding work-life balance and workplace satisfaction, provide the best value for the organization, and build resilient infrastructures. However, appropriate

considerations must take the technological, organizational, political, economic, and personal/spatial (by times contradicting) challenges into account (Messenger and Gschwind 2016).

# 2 Our Research

Based on our own long-term research experience with several SMEs (mainly from the Siegerland region), we have noticed that there is a certain reluctance when it comes to remote work – arguably due to more conservative views, a specific 'face-to-face culture' and ideas on how to organize work on this matter effectively. In this context, we certainly also have to take trust issues into account. Due to the lack of physical immediacy, an essential aspect of team and employee management is lost for leads and the company. Before the pandemic, companies had not seen the urge to promote the topic of Home Offices and related necessities, such as efficiently setting up, making accessible and effectively using a collaborative digital infrastructure that is as well connected, barrier-free, standardized, easy to use, open and (data) secure as possible. Positive experiences with Home Office, despite some inevitable and expectable teething troubles such as, e.g., connectivity issues or organization of virtual meetings, provided them with different conceptions of effectiveness. Still, we are just at the early stage of this possible transition phase: discussions already arose if, e.g., more flexible models regarding fixed costs for office space will be one lesson learned for the future.

We carried out a fundamental part of our CSCW-related research regarding flexible work and the pandemic (as a crisis) in a German video game company during the summer of 2020. Right in the middle of the two pandemic 'waves', our qualitative study explored the nature of distributed collaborative work and communication and investigated how people managed remote collaboration. Matters of IT infrastructure, hardware, privacy, data security, and individual household situations saw the company and its employees face various (often interrelated) challenges. As "stakeholders use imaginaries to negotiate their differences and identify shared visions (Kow and Lustig 2018)", *crystallization* as part of the *infrastructuring* process within CSCW research is a vital aspect to consider as it is a matter of decentralization. The latter, arguably, is a crucial aspect of resilience management. The terms "game-changer" and "wake up call for new work" were used during the interviews to indicate that there is no way back to the status quo of the pre-COVID-era.

During the workshop, we would like to bring in our perspectives on new forms of work and organizational infrastructures and how they can support the resilience strategies of companies. This way, we hope to be offer fruitful contributions to the discussion.

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# Strengthening Resilience with Agile Business Models and Strategy during Crisis Management

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**Abstract.** Successful business models are sustainable, economically successful and marketable if they are responsive to market changes and challenges. Due to the current change process and crisis management, business models must also be agile. The resilience of agile business models can be tested by new challenges again and again. This paper illustrates and discusses the possibilities, options and strengths of business models and how agile methodology can be used to face market challenges.

## 1  Crisis as a Test for Viability, Relevance and Resilience Measurement

Crises offer opportunities and a unique chance to get to know the stability, resilience, weakness and vulnerability of organizations, their units and infrastructures and to put them up to the test. In this case, we will look at publishing companies and take them as example scenarios.

In particular, due to the closure of bookstores, libraries, and schools, publishers were confronted with the challenge of reaching their customer groups. Thus, the strongest customer groups of the publishing house were affected. At the same time, the publishing house had to reorganize itself within its own organization, exchange information and be accessible to customers and buyers. An organization or company that did not have a diverse, varied customer base and distribution partners would suffer losses and, at the same time, lose the crises. It would lose revenue market position, lose existing customers, and would not be able to acquire new customers. On the other hand, companies that are better prepared for the crises emerge as winners from the crises.

## 2  Analysis of Companies in Crisis

With this consideration and background and development arises the question of what must publishers focus on in the crises and future stable and recurring revenue to be and remain competitive in the long term. At the same time, the focus should

be placed on the operating business segments, Verifiability and company system relevant part. Also, the unstable, fragile and unproductive parts can be highlighted in the analysis.

In order to perform the analysis more accurately and competently, various measures can help, including outsourcing and obtaining experts and providing an external view of the business. Only third auditing parties with work experience, work quality and know-how can understand the challenge of companies, put them under the microscope and approach core problems. This will lay the foundation for sustainable change, prospects and future development. This recommendation can identify long-term problems, predict development and develop proposals. The key questions of the analysis include questions such as: Which work units and departments have proven themselves during the crisis and, most importantly, to what extent should they affect current business models.



**Illustration 1: Noor Nazrabi**

# 3   Publishers in Crisis

Digitization has brought about a change in all areas of the book industry - from the relationship between publishers, bookstores, authors and readers to product offerings and distribution. New business models have emerged. Where previously there was no need for an analytical look at business model types that have been stable for decades, new players are now entering the playing field that needs to be looked at more closely.

**Illustration 2: Kay 1971**

The analysis of business models is based on two steps. Firstly, the comparison of companies on the basis of their business models, and secondly, a quantitativ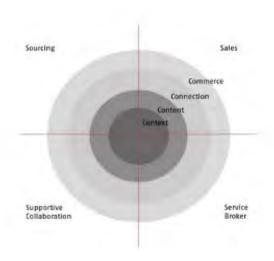e examination of business model types: In what frequency do they occur? These two steps result in an analysis matrix. From the abundance of available approaches and methods for the representation of business models, we have selected two approaches by Bernd Wirtz.

The 4C model classifies types of B2C business models in the media industry, distinguishing between content, commerce, context and connection. The 4S model, on the other hand, classifies B2B business models according to the categories Sourcing, Sales, Supportive Collaboration and Service Broker.

# 4   Business Model in Focus

In view of digitization and new platforms, the old business model is coming under enormous pressure. In order to continue to build competitive, economic, agile and stable infrastructures, the business model is central to all decisions and actions. In doing so, many attempts and tests have to be made to get a clear focus on the business model. A business model describes the basic functioning of a company. It shows how companies generate value, deliver this value to customers and siphon off value for themselves. At the same time, a business model is always only an abstraction of entrepreneurial reality. Accordingly, there is no generally valid and conclusive definition.

A business model is a dynamic system. As soon as it changes at one point, this has an impact on other areas and elements of your business model. This insight is

especially crucial for the strategic development of those models and an important prerequisite for their innovations.

"A business model is only successful if it offers a clear customer benefit in a sufficiently large market with a corresponding level of profitability."

# 5    Holistic Consideration of Target Group Need and Business Models

The crisis has had an impact on customers, suppliers, buyers and employees. This led to a new and changed life situation, other needs. It is also necessary to examine which business formats they use which usage behavior and sources of content have changed. The analysis will show that these have a direct and immediate impact on the business models of publishers, which must now be examined quickly but intensively and adapted if necessary.
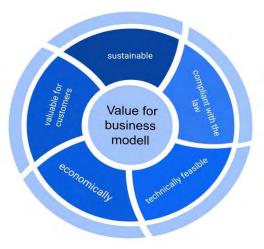


**Illustration 3: Noor Nazrabi**

Only by taking an open look at, for example, current customer needs and customer benefits can you clarify whether and which changes are to be recorded for your specific business model and what impact this may have on your core business. Here, the approach must be pragmatic and structured around the existing business models that will quickly show you the current limits but also (new) development potential. Guided should the analysis of customer needs be accompanied by the question, namely What contribution does it make to achieving the current business goals as well as does it still deliver on its value proposition for the specific target group? As a result, different measures and actionable goals could be derived.

This can lead to rigorous portfolio streamlining, freeing up new resources and capacities that can be used more efficiently elsewhere. It can also lead to more focus

in the future on business model development, target group research, market and portfolio analysis and much more.

Overall, crises can also lead to more streamlining, focusing and optimization of business processes and organizational structures. Above all, the possibility and expansion of resilience, resilient and on the basis of sound numbers, data and facts, as well as a clear strategic direction to work out. To transform the results, outcomes and conclusions into reality also require agile project management, implementation tools, transparent approach, integrative collaboration and decision modularity, which involves everyone and is not top-down prescribed and, above all, value-oriented. Namely, offering space for iterative trying, experimenting, testing and adapting.

**Illustration 4: Seven models of digital business models**



**Illustration 4: Cloudflight**


# 6 Resilience Through Agile Tools and Approach: Scrum

Agile management is characterized by new management and organizational concept. It is characterized by features like dynamic instead of static, informal communication and fast communication channels, flat hierarchies, short decisions, short implementation cycles, making independent decisions and acting independently. It is suitable for dynamic environments, flexible, open to changes, adaptable and can be used and tested in crises. Scrum can be used for this purpose:

Scrum is considered a framework within which people can handle complex adaptive tasks and through which they are enabled to productively and creatively deliver products with the highest possible value. Here, the following aspects play in the foreground:

- Vision: the pursuit of a long-term goal and overarching point of orientation
- Value orientation: results are measured by the value achieved for customers and the company
- Transparency: goals, decisions and upcoming tasks are freely accessible and known to all participants and stakeholders
- Focus: consistent prioritization of tasks that are at the center of attention
- Autonomy: autonomous, self-organizing and self-determined team
- Process fidelity: clear standard and following of processes
- Feedback: feedback from customers, users and stakeholders are closely and regularly involved in the Scrum process and contribute with their feedback to continuous improvement.



**Image 5: LitheSpeed** (LLC / https://lithespeed.com/lean-ux-dont-part-1-3-2/)

The goals must be guided by guiding objectives such as consolidating the resilience of companies and their business model, reducing fragility and strengthening resilience. The above method must be supported by certain KPIs.

# 7 Resilient Through Focus on Core Promises and Long-Term Revenues

In order to take over the market in the long term, companies must be prepared for a vision, mission and focus on the resilience business model. Also, added value benefit advantages must not be disregarded. Focusing on factors such as value proposition, customer-centric business model compatibility will lead in the long term to an agile, adaptable, fluid business model and thus resilience for the next crisis.
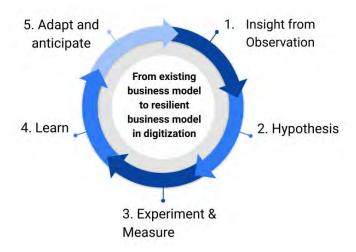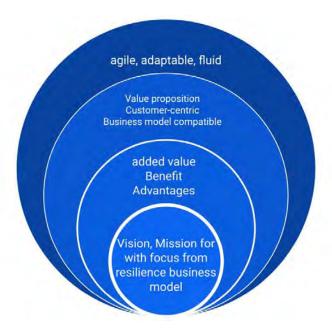
**Illustration 6: Noor Nazrabi**

**Illustration 7: Noor Nazrabi**

For a stable business model, lead factors are economically, technically feasible, compliant with the law, sustainable valuable for customers. Here, all agile processes must clearly focus on an approach that runs step by step.

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# Agility and Resilience of Local Authorities – the Covid challenge

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**Abstract.** The Covid-19 pandemic has created immense global social, economic, and political disruption. It has shown the importance of agile, functional and resilient cities. In the fight against Covid-19, public life has been reduced to a minimum. Still, local authorities (LAs) have had to continue to satisfy existing and emergent citizens' needs and implement, sometimes at very short notice, extreme measures to restrict movement, commerce, education and leisure activities. This poses significant challenges as they have had to enforce and communicate government plans, be proactive and respond to the local needs of their cities whilst learning to work in new ways and support the health and well-being of employees. The Covid-19 pandemic has forced organisational change. In many instances, this has accelerated the rate of change, proving that new ways of working are effective and has led to a (temporary) advancement of sustainable transport. This paper focuses mainly on the experience of SUITS, the H2020 CIVITAS SUITS project, called Supporting Urban Integrated Transport Systems, in the final year of the project.

## 1  Introduction

Cities have become epicentres of the pandemic, with high population densities and transport networks accelerating the spread and transmission of the virus at local, national and international levels (e.g., Newmann 2020). Although urban areas are associated with economic growth, lower unemployment and good social infrastructure – the gains and services are not equally distributed. Restrictions and lockdowns have slowed down the economy and led to economic setbacks affecting people and communities, which in some cases may be unrecoverable. In the transport sector, in the UK, restrictions were imposed on all forms of unnecessary travel, with public transport (road and rail services) being shut down, enforcing social distancing and wearing of masks, and offering minimal services for key workers.

The vulnerability of certain groups, communities and sections of society have been highlighted during Covid-19. This has included groups who may have been 'invisible' or not traditionally considered as vulnerable, such as health care staff, drivers, shop workers, those living in multigenerational families or who have to rely on public transport. Many organisations have stepped up or changed their operation to fill gaps in service provision to ensure that the basic needs of vulnerable citizens have been met (e.g., Nienaber and Rudolph 2021). It became clear from the

beginning that the virus does not affect all individuals in the same way. The first thing we learnt about Covid-19 was that infection was highly risky for older people or people with underlying health conditions. Therefore, local authorities put restrictions in place to shield people from high-risk groups first. However, health-related risk factors were not the only vulnerabilities that would put citizens at a disadvantage. Community health and well-being are associated with socioeconomic status and intertwined with other demographic characteristics like race, ethnicity, education, or disabilities. People from the lower socioeconomic background were not only more exposed to the risk of infection by living in densely congested, poor housing, but they were also more likely to hold low-skilled, temporary, precarious jobs that would be at risk of redundancies in the face of economic fallout. For instance, one of the most vulnerable members of the urban society – women immigrants - were also more likely to work in hospitality and services, severely impacted by the loss of business. It is estimated that only 1 in 5 countries have specific plans in place to help migrants during and after a crisis[1] despite their forming 14% of key workers in European regions (e.g., Kleine-Rueschkamp and Özgüz 2020) The needs of migrant workers employed in cities, one of the most vulnerable groups in society do not feature highly in transport-related research. These and many other examples from across Europe gave ample evidence that economic fallout caused by the pandemic hit the most vulnerable members of society disproportionately.

Cities are formed from businesses reliant on communal service delivery, social gatherings, and hospitality. For historically and culturally attractive cities, the economy is reliant on tourism and hospitality. Major cities are also places of learning, swelling their populations by 10,000s of young people each year. In all cases, increased rates of exposure increase the likelihood of catching the virus. Proximity makes the virus spread faster, especially in enclosed and poorly ventilated spaces. Such businesses have been severely affected by the lockdowns causing redundancies or – in the case of smaller companies – bankruptcy.

Each city has a different set of challenges determined by its geopolitical landscape and demographic make-up. In most cases, the complex systems of operations that create intertwined and interdependent networks have been shaken, if not significantly damaged. As has already been stated, the breakages have revealed massive inequalities and unacceptable burdens placed on some of the lowest paid in society.

Covid-19 has also created a chance to reappraise priorities and look for different ways of doing things. Bringing the discussion back to transport, people are more aware of the impact the daily commute had on their lives and the environment, and for the first time, there has been a recognition, however short-lived, that people working from home can 'get the job done.'

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[1] https://migrationdataportal.org/themes/migration-data-relevant-covid-19-pandemic.

Travel restrictions, bans on social gatherings, total or partial lockdowns, halting non-essential production, and operations had a ripple effect on the urban ecosystem. Firstly, a dramatic decrease in car traffic changed the urban environment. Not only did air quality improve due to a significant reduction in CO emission, but also noise from traffic decreased. In some touristic cities, like Venice, halting tourism and air travel have improved the overall quality of water due to drastic drop in wastewater1; satellite pictures of canals in Venice or citizens enjoying crystal clear air in historically industrial and polluted cities seen for the first time for years were going viral showing the evidence of the detrimental impact of human activities on the environment. Although sustainable strategies were in plan for years, for many local authorities, the pandemic and forced travel restrictions offered ample evidence that – with well-synchronized interventions – we can build more sustainable and liveable cities with the resources we already have.

Banning social gatherings has led to transferring non-essential business and services to online operations (see, e.g., Nienaber and Rudolph 2021). Even if the change was just temporary, it has transformed the way we think about the rigid office and school hours. Flexibility in the working pattern or working from home turned out to be very much needed by families with young children, women, persons with disabilities or anyone for whom daily commuting was inconvenient and time-consuming. Traditional working patterns create surges of demand across transport and physical infrastructure and in energy use. With more flexible working patterns, digitalisation and remote operations, cities might never again be the unquestionable hubs for employment as many employers are now expected to embrace a hybrid model of working and give employers a choice to work from home if they wish to. Remote work piloted across Europe resulted in a slashing of office space rents. If the trend persists, it will affect the business parks and city centres that will no longer be bastions of the traditional, office-based corporate culture. A key issue going forward is the extent to which people will want to return to a pre-Covid situation, who controls the rhetoric and steers the direction of our cities. Many experts assume that individual mobility will experience a new high. But how can we prevent people from switching from public transport back to private cars – to consider a long-term threat, rather than the more imminent threats to their health? How can you prepare the bike infrastructure (pop-up bike lanes) for the expected increase? What role will sharing concepts play?

At the time of writing (April 2021), it has been over a year since the World Health Organization declared Covid-19 a global pandemic. It is perhaps too early to acknowledge the full impact the pandemic has had on cities. However, the early lesson that emerged from the crisis was that resilient and sustainable cities around Europe were able to handle the pandemic better. For many local municipalities' lockdowns tested their strengths and weaknesses. It has set the scene for the implementation of holistic action toward inclusive, sustainable development. Many examples on how to build resilient and sustainable cities emerged from good

practices across Europe (100 Intelligent Cities Challenge[1]) and highlighted how working together with stakeholders and citizens can enhance preparedness for future obstacles.

## 2  Local Authorities

In the European Region, local governments and other local organizations have become key responders and are still at the forefront of epidemic containment. They are responsible for communicating and implementing government mandates, regulations and guidelines to reduce the risk of infection. Acting as advisory bodies, local authorities also provide access to the local population and can provide supportive guidance in cushioning the worst long-term economic and social consequences of spatial distancing measures. They are the operational partners of national governments: the central actors in national preparedness and response planning, essential service providers and play a central role in creating a sustainable future. They also serve as a central point for reaching and involving people as part of the solution: through targeted risk communication, public transport and other services or through guidelines from national governments.

In the course of the SUITS project, nine cities: Kalamaria (Greece), Valencia (Spain), Alba Iulia (Romania), Rome and Turin (Italy), Stuttgart and Dachau (Germany), Palanga (Lithuania) and West Midlands (UK) have been part on the journey to becoming resilient and agile LAs.

## 3  Effects of Covid-19 on SUITS cities

By Spring 2021, UK partners and many members of the consortium have worked from or are still working from home, experiencing the effects of a series of lockdowns and the effects of different national approaches (e.g. herd immunity, mass vaccination). UK academics are still working from home, as they have been doing since March 2020. It is unlikely that universities will return to anything like business as usual until autumn 2021, with online learning, restrictions to the number of people who can physically attend lectures, and travel restrictions. It is unlikely that we will return to pre-Covid ways of working, having demonstrated that we can work effectively from home, are sufficiently familiar with technology and have started to enjoy a higher quality of life - which had been eroded by the stress and time spent in commuting to and from the office. In local authorities, most employees were expected to work from their office. Again, they have proved that they can work from home and may not return to former working patterns after the

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[1] The European Commission's Intelligent Cities Challenge, Covid19 Good City Practices, accessed March 2021: https://www.intelligentcitieschallenge.eu/covid-19-good-practices.

Covid-19 lockdown ends. If the ability to work from home is supported across a lot of industries, this will have a profound effect on mobility services and local economies as many businesses have grown up to support traditional working patterns and service the needs of the commuter.

In the following sections, we concentrate discussion on how the cities in SUITS responded to the challenges brought about in the pandemic and how European cities can learn from the last months for their future mobility strategies. Special attention has been paid to the employees in the local authorities, as they are the ones who have had to deal with current mobility challenges whilst at the same time engaging in the delivery and planning of more sustainable measures. This section is organized along with four key topics: (1) Organizational change, (2) Digitalization, (3) New mobility services and (4) Data-driven approaches.

## (1) Organisational change

When the UK government responded to the first wave of the pandemic, a tight lockdown was enforced, which required staff to work from home, with a very little period of adjustment. This meant that all staff within the LA were working from home along with members of their family who were not classified as key workers and also looking after children (the system of home schooling took longer to establish).

SUITS LA partners adopted remote working as the new standard with employees working together across departments, changing communication flows, working patterns, hierarchical structure and taking on new tasks – from contact tracing to manning municipal Covid-19 hotlines, to being part of the "Covid patrol" of the municipal security services (see Nienaber et al. 2020, Nienaber and Rudolph 2021).

The immediacy of lockdown left little time for planning new forms of communication or working structures. Teleconferencing quickly became ubiquitous, although bandwidth availability from home, making do with existing home computers and laptops, system incompatibilities, lag time[1] and lack of familiarity with different systems remain daily problems. Moving all work online has also led to general problems such as too many meetings' schedules with little time for breaks, lack of control over invites, constant telepresence, and the need to rapidly switch from one group/topic to another has resulted in cognitive overload, 'zoom fatigue'[2], (n)etiquette[3] issues and difficulties in performing essential non-screen-based tasks. We are working harder, for longer, in-home spaces which may be shared by family members (e.g., partners and those who are home-schooling), and not designed as full-time offices, without physical, social contact.

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[1] https://www.bbc.com/worklife/article/20200421-why-zoom-video-chats-are-so-exhausting.

[2] https://www.cnbc.com/2021/02/25/zoom-fatigue-why-we-have-it-how-to-fix-it.html.

[3] https://money.howstuffworks.com/business-communications/teleconferencing-etiquette.htm.

Covid-19 made LAs aware of the need for greater flexibility and resilience trust, better communication and technological know-how (from e-financing, e-forms, use of social media to document management systems) and change management in dealing with colleagues, stakeholders, partners and citizens (Nienaber, Spundflasch and Soares 2021). The adaptability and resilience they have shown have given LAs confidence in their ability to change.

SUITS LAs who had, by the time of the pandemic, built-up capacity through attended training events offered as part of the Capacity Building Programme, and worked through most of the organisational change process, were in a strong position to adapt to the crisis. For example, they understand the importance of trust and citizen engagement had built up networks and set up communication protocols (Nienaber et al. 2020).

For example, the transport innovation team at WMCA had already used teamware, set up communication protocols in their group, were used to share information and data with other departments and held virtual meetings with the directorate. The innovation team increased from 5 people to more than 25 members. They implemented 'learning organisation' principles in response to Covid-19 challenges due to the recent challenges of the pandemic. Additionally, a representative from the innovation team is now part of all major boards, raising the profile of the team and the projects around digitalization.

Organizational change is built on and requires technical equipment and behavioural change (Nienaber et al. 2010). The cities which were familiar with organisational change processes and had built up their technology know-how were in a better position to cope with the challenges of the last year (Nienaber and Rudolph 2021). For example, end-to-end digital administration is only conceivable with e-files, a document management system and resilient network infrastructures. To use the words of Rome's mobility head: "Smart working and digitalization: it's a structural revolution and not only a passenger phenomena!" The city of Rome intends to redesign its infrastructure according to the requirements of the recent pandemic and preferences to work smartly and remotely.

The Covid-19 crisis is revolutionizing classic work structures as summarized in the term "home office". What is important is what work will look like in the future, which skills will be important and how employees will help to shape this. Vocational education and training are central here, and close cooperation between municipalities, states, the federal government, academia, educational institutions and trade unions is needed. The SUITS cities became learning organisations through close cooperation with academic and educational institutions (Nienaber et al. 2020).

To make those changes last, cities will need to develop new strategies for their future. SUITS highlighted the need for 'a vision' and presented different tools to develop and communicate a new vision. Although it was recommended that visions

have some longevity, post-pandemic reflections may lead to new city visions shaped by data and through engagement with citizens.

## (2) Digitalisation

This is taken as referring to both the move towards online services and technology-enabled working. Over the course of the project SUITS' LAs were exposed to and shared different ways of working and smart mobility solutions. They were, therefore, in a strong place to start using their experience in small but significant ways during the pandemic. Self-auditing and reflection enabled them to identify situational needs and requirements and how they could respond to the new challenges. For example, many cities (e.g., in the West Midlands, Torino, Valencia, Stuttgart or Dachau) introduced digital administrative processes such as appointment booking systems, applying for parking permits, reporting infrastructure problems via portals.

Citizens found that the administration not only has emails and contact forms but actually answers them. Interactive platforms had been discussed before the pandemic as an opportunity to enhance citizens' engagement. Valencia and Dachau presented interactive web pages to receive complaints and requirements from citizens in relation to their mobility needs, e.g., need for a cycle route, more traffic lights or more security around places frequented by children such as playgrounds nurseries or schools. To keep such portals alive, citizens expect immediate answers. During the pandemic, the cities built on their experiences with such interactive platform spaces to interact with their citizens on health and well-being topics, such as needs for medicine or food in particular to elderly citizens.

## (3) New mobility services

LAs have quickly adapted to working during Covid-19, implementing both planned mobility measures and new ones in response to Covid-19. In this section, we review some of the new sustainable transport measures which have been developed and rapidly implemented in response to changing mobility patterns and the need for social distancing.

During Covid-19, the number of taxi bookings has reduced by around 80 per cent. To compensate for this, taxis have had to expand their service offering. Palanga helped to bring together the city's taxi companies to deliver prepaid groceries and medicines using e-commerce principles. Palanga has demonstrated that it has the authority and trust to form new partnerships which meet the changing needs of its most vulnerable citizens,
Rome became aware of the need to better use city resources and to avoid "rush hours" and has promoted "active modes" of transport such as bikes or scooters. It is making renewed efforts to limit the predominance of cars and support alternatives

for mobility and has become more aware of the need for a better lifestyle for its citizen and is therefore recovering local spaces to save the environment.

Valencia was able to set up important sustainable transport measures to cope with Covid-19. The most significant of these include reducing bus capacity and keeping the service running with safety measures in order to reduce the Covid-19 risk and keep on providing quality service, a plan to improve public space for pedestrians and bikers, which will improve social distancing, reduce the number of accidents and air pollution and improve the quality of life, collection of proposals for Covid-19 in Valencia through Agencia de la Bici (Bike Agency), with effective impacts to be confirmed, RAL COVID-19 I: Protocol for the prevention of Covid-19 in Logistics and Transport Operations, as recommended in the guidelines elaborated by the Ministry recommendations for the prevention of Covid-19 infections in warehouses and logistics centers. Millions of Euros have been ringfenced to create bike lanes and pavements.

Kalamaria has set up a series of measures to prevent the spread of Covid-19. The most important ones relate to the increase of car-free zones (pilot program), having a direct impact on green mobility, less pollution, innovation, and better quality of life in urban spaces, decrease in the use of PT due to fewer itineraries and decreased occupancy of public transport vehicles (50%), that generated less passenger interaction, more safety for travellers and better public health, increase in freight transit over short periods based on increased citizens needs especially for shopping in supermarkets, generating less congestion due to decreased car use, less air pollution due to optimized vehicle routes, as well as the positive economic impact for companies.

Covid-19 has had many effects on mobility in Turin, with public transport suffering the most because not travelling with a full load does not achieve acceptable levels of cost-effectiveness. Taxi services are also suffering, especially for business users who have reduced their travel between cities and towns to a minimum. E-commerce for both goods and food has increased, resulting in a rapid rise in freight transport. With the introduction of "smart working", journeys to and from work have collapsed with a significant reduction in the number of kilometres travelled by private vehicles and a considerable reduction in C02 and Nox.

In order to promote individual but at the same time sustainable mobility at the national level, processes of legislative changes have been triggered for the implementation of soft mobility infrastructure. Incentives have also been introduced for the purchase of bicycles and e-scooters. The latter measure was very successful, and funds were quickly exhausted.

Turin and the main cities in Italy have applied new regulations and immediately implemented soft measures to increase the number of kilometres dedicated to cycling and soft mobility. As a result, roads with a speed limit of 20 km/h were built, or traffic bollards were installed to prevent traffic.

In general, all SUITS city partners underlined the importance of bicycles for their cities. During Covid-19, the bicycle has been and is a useful means of transport for unavoidable trips. It is a good alternative to public transport and more environmentally friendly than the car. Also, the World Health Organization has underlined the benefits of cycling and walking as a means of transport as they both allow for physical distancing and enable exercise.

The City of Stuttgart, for example, has supported cyclists since April 2020 with free access to the Bike Citizens navigation app. The Bike Citizens app offers map displays and route planning, especially for cyclists. Maps can be downloaded, and routes can be announced using voice control. Cyclists can download the Bike Citizens app in Stuttgart for one year free of charge; there are no additional costs for longer-term use. A similar development can be seen in Valencia. While Valencia was already very active to promote cycling in their city, the recent pandemic increased these efforts dramatically.

## (4) Data-driven approaches

Based on comprehensive data collected over the period of four years via several workshops and semi-structured interviews with seven public authorities in Europe, we were able to demonstrate that one of the main obstacles to data sharing was the public employees who distrust online platforms, their providers and users (Nienaber, Woodcock and Liopolous 2021).

The Covid-19 pandemic has acted as a catalyst for data sharing. All cities in SUITS became aware of the need to use and integrate passenger and freight data to inform mobility planning. SUITS supported mobility transformation and decision making for local authorities (LAs) through the gathering and processing of crowdsourced floating car data (FCD) of citizen and freight mobility, from which integrated transport planning can take place (Georgiadis et al. 2020, Pirra and Diana 2019).

This data-driven approach showed that with proper incentivization, citizens, taxis and logistics companies can provide accurate and adequate data for monitoring real-time traffic conditions of a city's entire road network. By segregating various traffic sources, freight traffic can be inter-correlated with other urban mobility patterns. This will enable local authorities and policymakers to effectively evaluate the impact of temporary or permanent mobility measures related to freight, e.g., route changes, delivery timeframes, loading/unloading zones, reduction of the number of freight trucks delivering within congested areas, etc., thereby resulting in the overall reduction of driven distances and travelling time, as well as improving urban accessibility and speed of distribution of goods. Such crowdsourcing could easily be extended and incorporate more information, depending on the willingness of the user to share data.

While the benefits of big data in increasing public authorities' efficiency and effectiveness and their citizens' life are well understood, examples from the public

sector that highlight public authorities' engagement in such sharing activities is still missing. The use of SBOINGs tools showed the decline in taxi service operations during a lockdown. For example, mobile users could indicate their shopping trips with the purpose of helping vulnerable people, i.e., co-buying food and medical equipment for residents who wish to stay or are forced to stay at home.

# 4  Conclusion

A learning organisation is characterized by high levels of agility and resilience. SUITS partner cities had been building capacity as part of their organisational change process throughout the project. Going through this process has helped during the current crisis because LAs:

- did not have such a steep learning curve as they were familiar with organisational change processes, and through SUITS activities had widened their circle of contacts across departments
- were more aware of legal and regulatory frameworks
- were more familiar with the use of technology, e.g., to support meetings, collect data, engage with the public
- had a wider knowledge of sustainable transport measures and how to implement them during and after the pandemic
- understood how to make changes long-lasting within the organisation

LAs have become very agile and efficient during Covid-19, quickly implementing active transport measures – such as creating additional bicycle lanes. Rome, **Palanga** and **WMCA** have already shown examples of how Covid-19 is setting new standards in their cities. Rome wants to continue mobility data monitoring[1] to provide support for the next phases and respect for the social distancing and also became aware of the role of mobility managers in their city. The mobility managers' role needs to be enhanced and integrated into the mobility system of the city in order to have direct feedback on different measures and to coordinate the efforts. This learning will remain and help to successfully manage future mobility challenges.

After SUITS, the cities are keen to build on close relationships with academia. Several "**cross-learnings sets**" have been set up with the support of Coventry University, which is designed as informal communication groups to discuss recent trends, developments and activities. For example, Valencia, Coventry and WMCA built a group that wants to continue to exchange knowledge on mobility topics. Close cooperation has also been built up between Rome and Valencia. Both examples also foster peer-to-peer learning and cooperative problem-solving. Rational learning approaches suggest that actors that face similar problems may

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[1] https://romamobilita.it/it/covid-19-impatto-sulla-mobilita.

turn to their peers in search of suitable and proven solutions. Understanding which solutions worked well in other municipalities reduces costs and efforts for the identification of adequate and effective measures and may avoid potentially costly negative lessons from trial and error.

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# Doing research with SMEs: Participation, voluntariness and the role of the researcher

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**Abstract.** Based on different theoretical studies analyzing the substitutability potential of employees through means of automatization, the authors set out to make a practice-oriented study on this topic. During their research, the authors identified different interesting aspects for discussion revolving around participatory research.

## 1 Field of research

The ongoing digitization confronts especially SMEs with a long tradition of high-quality work, manufacturing and professional workers in redesigning established processes not only along the value chain but companywide. The publication of several reports, for example, Dengler & Matthes (Dengler & Matthes 2018) and Frey & Osborne (Frey & Osborne 2013) about the loss of jobs and professionalized and skilled workers resulted in an uproar by multiple local companies because they produce special products for niches and fear to lose their competencies due to the implementation of digital technologies and the accompanying staff reduction. For an overview see Heinen et al. (Heinen et al. 2017).

The University of Siegen, especially the chair of Business Informatics and New Media, has a long tradition of exploring how software affects work routines or other on-the-job processes. Studies in this realm of "socio-informatics" uses qualitative research methods (Tracy 2013) and are normally conducted in practice.

## 2 SME context

To have a practice-oriented take on the above mentioned rather theory-based studies, a consortium of different institutions, multipliers and companies was found to (in some way) disprove the articles and forecasts (many based on the initial study by Frey & Osborne (Frey & Osborne 2013)) and examine what workers are really doing in their daily work. (This consortium and study are all within the realm of a third-party funded project aimed to support SMEs within the digital transformation).

The SMEs vary in size and field of application: The first company, a car merchant, operates in the region and has several branch offices, offering new and used cars and workshops for inspection of cars. The second company is a metal-working organization producing components mostly to be built into cars. The third and fourth companies are active in the crafting sector. One company is a local SME for electric equipment and installation, and the other one is a manufacturer of doors, windows, and other exterior equipment. In the end, two of the four companies that were willing to participate in our study did not make it further than the introductory phase. This is possibly connected to a good business climate with a high workload. The other two companies participated like initially planned and let us analyse different workers and departments.

# 3  Methods applied

The study uses the methods mentioned above of empirical field research to gain precise insight into the practice and working methods of the employees in the companies and based on this, to give a more accurate picture of the possibilities and effects of modern technologies, especially in the area of SMEs.

In an initial appointment with the management and the employees, the authors explained what the aim of the study was and how it would be carried out. The previous studies that predicted the strong job cuts were explicitly mentioned and criticism of them was explained to take away possible fears and reservations of the employees towards the study leaders. For this reason, the study staff (the authors) were also explicitly presented as interns.

As the participants were experts on their jobs, Suchman (Suchman 1995) highlights that they could tend to obscure their actual tasks or are not as honest to the authors as expected. Therefore, the term "intern" was used explicitly, and the authors expected to help with the tasks and not only observe but get engaged with the workers and tasks. At this said meeting, further organizational arrangements were made, for example, in which period the studies can take place in the company.

The participating employees were selected in such a way that a broad spectrum of professions in the company or company departments is covered and analyzed. The selection was made by the management, the personnel department or the employees themselves. It was preferred that particularly experienced employees participate in the study. In total 25 employees were accompanied in the two companies.

According to this, employees completed a 6-7-hour internship day with each participating employee, during which they were accompanied by one of the authors for several hours each. During this time, a "log-book" was written which included information about the work processes, hard- and software used, contact to colleagues, necessary improvisation, etc. In addition, a semi-structured interview with the same topics was conducted, which contributes to the subsequent

evaluation. The processing of the notes took place after the internship dates. The audio files were transcribed and analysed.

While summarizing the findings we focused on the following topics (i) Coordination and Exchange, (ii) Qualification (needs) of employees, (iii) Knowledge Management, (iv) IT-Infrastructure, (v) Idea Management and (vi) Change inside the company.

# 4    Personal background

Nico Vitt studied Business Informatics at the University of Siegen and reached his master's degree in 2018. He then started working at the chair of Prof. Dr. Volker Wulf and focused his thesis on the topics cybersecurity and supporting maintenance in SME. Marc Gerbracht studied Management & Economics at the University of Bochum and Entrepreneurship and SME Management at the University of Siegen. He is interested in work-oriented consultation, co-determination and the work of trade unions and works councils in the digital transformation. He is a research assistant at the chair for Information Systems and New Media at the University of Siegen. Since 2017 he works in the project "Mittelstand 4.0-Kompetenzzentrum Siegen".

# 5    Open questions and problems

The main topic that the authors want to address in this workshop revolves around the two aspects participation and voluntariness. As mentioned above, the authors researched two (of initially four) SMEs of different branches. Within these companies the authors investigated the work routines of 25 employees, covering as many different departments as possible to generate a sound understanding of the working practices and the business models within these companies. The aim was to contrast these research results with possible substitutability potentials of different jobs illustrated in various studies from 2013 onwards.

Within this study and several other scientific endeavours as well in talks with colleagues the following aspects regarding research with SMEs emerged:

- As the employees mainly were picked by superiors: Is participation of employees always as voluntary as it is often displayed? (Which employee will say no if his supervisor asks him to participate in a study?)
- In general: What role does voluntariness play in participatory research/design (especially in SMEs)?
- Which implication has an involuntary but as voluntary displayed participation of employees for a study and its results.

- In how far should participation be voluntary? (Does participation even claim to be voluntary?)
- How does the presence of researchers in SMEs result in changing work practices (to make it look good)?
- How can researchers perform such internships and be accepted by the workers and to which extent?

In the workshop we would like to discuss these aspects with different researchers and would like to gain insight in their very own experiences regarding participation and voluntariness in their research undertakings.

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