

Overcoming crises together

Towards a research agenda on how internal and external collaborations strengthen municipal resilience

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September 2024

evoREG Research Note #46

evoREG Research Notes Series' editor: Emmanuel Muller (Fraunhofer ISI)







1 Introduction

Current change events and future extreme events are conceptualised in research using different approaches, but they also have some common characteristics. These events can be regarded as complex, aversive and dynamic, as there is no predefined solution for them, they usually occur in an unpredictable way, they pose a threat to the maintenance and survival of the affected systems, such as natural, personal, but also social and organisational systems, and they thus cause a state of great instability in the affected systems. The resulting effects, such as the multipolarity of crises, cascade and tipping point effects, represent a major challenge in dealing with these events. Another common feature of these events is that the response to those events is usually organised at a societal macro level, such as the national, continental or global level, but their impact always takes place at the micro level of the social order, namely in the municipalities.

It is the municipalities that have to deal with the consequences of increased heavy rainfall events and periods of drought as a result of climate change, containment measures during a pandemic or the accommodation of refugees due to acts of war, while at the same time providing their citizens with the necessary basic services. After all, this is precisely the basic task of every municipality: to ensure the provision of services of general interest for its residents. The problem here is that municipalities are not equipped per se to deal with the consequences of complex, aversive and dynamic events in a permanent mode and at the same time provide their residents with the necessary services of general interest. Municipalities suffer from limited information about aversive events and a lack of resources to respond to these events accordingly. One reason for this is that, due to the complex and dynamic nature of these events, municipalities have information in their own area of jurisdiction, namely the municipality, but little information is available in other geographical and technical areas. In addition, municipalities are usually equipped by their nation states to the extent that they can fulfil their tasks of providing services of general interest, but no additional equipment is provided for in the context of economic budget management and resource management. In order to overcome this problem of limited information and resources, local authorities are increasingly trying to pool and utilise existing internal information and resources more effectively and at the same time mobilise additional information and resources from external actors. To achieve this, local authorities are entering into various forms of collaboration.

This article addresses the question of how internal and external collaborations can strengthen the resilience of a local authority. To answer this question, the relevant knowledge currently available was compiled and analysed in an intensive literature review. Chapter 2 analysed therefore the problem of limited information and resources at the municipal level in dealing with complex, aversive and dynamic events, assigned it to a specific problem typology and embedded it in the theory of complex adaptive systems. The concept of resilience, which was identified as relevant to the solution, was further concretised in chapter 3 and defined according to the object of investigation in chapter 4. Based on this definition, a concept of municipal resilience was developed in chapter 5, which is particularly relevant and applicable to small municipalities and already provides initial indications of collaborative arrangements within the resilience process. These points of reference were then concretised in chapter 6. The developed concept of municipal resilience was analysed specifically in terms of the potential influence of internal and external collaborations and a catalogue of 21 working hypotheses was drawn up. This catalogue of working hypotheses can now in turn represent a potential research agenda for future empirical work in this area.

By focussing on collaborative arrangements, this article aims to contribute to research into contextual factors in the resilience process. Collaborations can make a decisive contribution to supplementing hierarchical structures and processes of municipal service provision in favour of effective and efficient governance for resilience.

2 Theoretical embedding

In order to develop suitable solution strategies and tools for certain problems, it is first necessary to precisely determine the type of problem to be solved. For example, a screwdriver is an ideal instrument for screwing a screw into a suitable material. However, it is highly unsuitable for solving a mathematical equation. The type of problem therefore determines the choice of solution instrument. At the same time, it is also necessary to know the rules and mechanisms behind a solution tool in order to be able to decide how this tool should be used. Even if the use of simple solutions sometimes seems tempting, a look at the theory behind them can lead to a different judgement. The aim of this chapter is to typify the municipal problem of the need for action due to complex, aversive and dynamic events with simultaneously limited information and resources, to find a theory for solving these problems and to derive a solution strategy from this theory.

Problem typologisation

According to Zivkovic (2013), the first step in overcoming problems is to determine the type of problem in order to develop suitable coping measures. Kania and Kramer (2011) differentiate between technical and adaptive problems. Technical problems are characterised by the fact that they are definable and can be solved by one or more organisations using already formulated solution strategies. Adaptive problems, on the other hand, have a complex character, which means that no pre-formulated solutions are available and the solution to these problems cannot be implemented by a single organisation. Another model of problem typology was developed by Westley et al. (2007), which distinguishes between simple, complicated and complex problems. Simple problems, like the technical problems already described by Kania and Kramer (2011), can be solved using an existing procedure ("recipe"), as the cause-and-effect relationships of these problems are clearly recognisable. For this reason, solutions to simple problems cannot be replicated in other contexts. On the other hand, there are complicated problems.

These problems can also be determined in advance, but differ from simple problems in that they contain many different elements which, due to their number and the resulting multitude of solution strategies, make problem solving more difficult. Westley et al. (2007) compare complex problems with the education of a child. Since each context in which the education takes place, as well as the children themselves, are different, no pre-formulated solution strategies can be applied. Complex problems are unpredictable, as even the formulation of the problem is not standardised and the problem is constantly changing due to the opaque cause-and-effect structure. For this reason, solutions to complex problems are difficult to replicate and transfer to other contexts (cf. Zivkovic, 2013, pp. 30-31). A final model of problem types to be described here is that of Rittel and Webber (1973). They distinguish between tame problems and wicked problems. Tame problems are characterised by the availability of all the necessary information to solve the problem, which means that a clear formula can be developed to solve these problems. Examples of this are chemical analyses or mathematical equations. Wicked problems, on the other hand, are characterised by the fact that not all information is available to solve them and therefore the definition of the problem cannot be standardised, as this definition can differ depending on the degree of involvement due to a large number of interdependencies and conflicting objectives. Due to these interdependencies and multiple cause-and-effect chains, attempts to find a solution can have an impact on unintended areas (cf. Zivkovic, 2013, pp. 31-32).

Model	Problem type	Characteristics
Kania and Kramer (2011)	Technical problem	Definable and can be reme- died by already formulated solution strategies by one or more organisations
	Adaptive problem	There are no pre-formulated solutions and the solution cannot be implemented by a single organisation (com- plex nature)
Westley et al. (2007)	Simple problem	Can be solved by an existing procedure ("recipe"), as the cause-effect relationships are clearly recognisable
	Complicated problem	Can be determined in ad- vance, but contains many different elements which, due to the resulting multi- tude of solution strategies, make problem solving more difficult

The problem typologies presented here can be summarised in a table as follows:

	C	A
	Complex problem	Are unpredictable, as even
		the problem formulation is
		not standardised and the
		problem is constantly
		changing due to the opaque
		cause-effect structure; solu-
		tions to a complex problem
		are difficult to replicate and
		transfer to other contexts
Rittel and Webber (1973)	Tame problem	Development of a clear for-
		mula for solving the prob-
		lem is possible because all
		the necessary information is
		available
	Wicked problem	Numerous interdependen-
		cies and conflicting objec-
		tives influence the degree of
		involvement and thus pre-
		vent a standardised defini-
		tion of the problem; at-
		tempts to find solutions can
		have an impact on unin-
		tended areas due to interde-
		pendencies and multiple
		cause-and-effect chains

Figure 1: Illustration of different problem types (source: own illustration based on Zivkovic, 2013, pp. 30-32).

If we now attempt to typologies the extreme events that local authorities are confronted with, we will find that almost all of these events are adaptive, complex, wicked problems, as they do not involve generally definable and objective solutions and the definition of the problem itself varies depending on the context. The effects of natural disasters, acts of war or even the dangers of an industrial accident are very dependent on their temporal and local context and cannot be uniformly defined on a time-space axis. There is therefore a need to develop new and innovative solutions (cf. Zivkovic, 2013, pp. 29-30). Such solutions could be found in the theory of complex adaptive systems, as this type of systems develop self-organisation and adaptive capabilities that are necessary to respond to these problems and prevent the system from collapsing (cf. Zivkovic, 2013, p. 33). Since Rittel and Weber proposed working together in networks to improve interactions between agents in order to develop a common understanding of the problem definition and solutions as early as 1979 in order to overcome wicked problems, the first indications of the relevance of collaborations for dealing with this type of problem can already be recognised here (cf. Crowley, Head, 2017, p. 545).

Complex Adaptive System Theory (CAS)

According to general systems theory, systems consist of agents, relationships and a delimited environment. These agents represent the individual elements of the system, which cannot be further divided and are related to each other and to the environment. The behaviour of the agents is mutually influenced by these relationships, so that they are in a relationship of interdependence (cf. Nolte, Zimmermann, 2015, p. 51).

In the case of complex adaptive systems (CAS), the distinction from other system theories is made on the one hand by the complexity of these systems and on the other hand by their adaptability. The fundamental assumption here is that changes do not occur in a linear, predictable way and that a systemic state of equilibrium is created by non-linear, i.e. dynamic, effects and feedback loops between the agents. This opens up a greater variety of possible system behaviour (cf. Duit, Galaz, 2008, p. 312). Bristow and Healy (2014) describe complex adaptive systems as a network of agents, for example cells, people, departments, companies or even entire nations, which constantly influence each other through certain interactions, such as communication, shared tasks or relationships. The system is successful if it can create space for emergent behaviour, for example the development of emerging ideas and technologies (cf. Bristow, Healy, 2014, p. 97). With regard to emergent behaviour, Duit and Galaz (2008) speak of a coevolutionary process that generates behaviour with limited predictability at the macro level of the system (cf. Duit, Galaz, 2008, p. 313). The internal structures and processes of such systems can change spontaneously due to their adaptability and non-linear dynamics (cf. Bristow, Healy, 2014, p. 94).

Carmichael and Hadzikadic (2019) describe how a CAS works using the example of the slime mould: the agents of the slime mould represent its cells, which are extremely homogeneous among themselves and influence each other's behaviour via feedback loops. The behaviour of the agents is only determined by the two rules that they are or are not attracted to a messenger substance. If a change in the environment occurs, the cells organise themselves. This self-organisation causes a non-linear dynamic that leads to adaptation to new environmental conditions (cf. Carmichael, Hadzikadic, 2019, pp. 6-7). Self-organisation theory now states that disturbances, i.e. phases of instability, are a necessary prerequisite for the emergence of complex order. In order to develop new forms of order, a system requires a phase of instability in order to reform itself through its ability to self-organise and return to a stable state (cf. Kruse, 2020, pp. 57-58). Self-organisation is the basis for emergent behaviour. This arises through the feedback of the individual agents. This means that they apply their own simple rules of behaviour, but are induced to self-organise due to environmental changes via feedback to other agents (cf. Carmichael, Hadzikadic, 2019, p. 13). Due to this self-organisation, the system continuously adapts to the environment and thus opens up new ways of acting. Comfort (1994) defines selforganisation as the ability to reorganise and reform patterns of action in adaptation to changing needs and capabilities of the system and also to changing needs and possibilities of the systemic environment (cf. Haraguchi, 2020, p. 780). With regard to the dynamic capabilities of organisational systems, Veit et al. (2019) identify those competencies of an organisation that enable it to learn new things permanently and systemically. Behind this is the question of how an organisation can expand its resource base in order to react to environmental changes and thus maintain a strategic advantage in competition (cf. Veit et al., 2019, pp. 709-710).

The functionality of a CAS can be represented graphically as follows:



Figure 2: Functionality of a complex adaptive system (source: own illustration).

If we summarise the insights gained above, we can conclude that most of the problems that municipalities are currently facing are seen as complex or wicked problems. In order to respond to them appropriately and at the same time remain capable of acting, municipalities need skills that are adapted to these problems. How a municipality can develop such capabilities can be identified on the basis of the theory of complex adaptive systems. Here, a system needs the ability to self-organise in order to develop emergent behaviour in the form of adaptive performance and dynamic capabilities in the event of a disruption. However, the theory of complex adaptive systems alone does not explain exactly how a system, in this case a municipality, can produce these adaptive and dynamic capabilities. For this, we need to take an analytical look at the concept of systemic resilience derived from CAS. What this means and how it can be adapted to the case of municipalities is the subject of the following chapter.

3 Resilience from different perspectives

In order to develop a suitable resilience concept to ensure the provision of services by local authorities, even in dynamically changing contexts, it is first necessary to define the conceptual framework. In order to fulfil this requirement, this chapter presents and explains the perspectives on systemic resilience that are currently widespread in the scientific community.

There is still no consensus in the scientific community as to what organisational resilience means and what elements it contains. In contrast to related concepts such as flexibility and agility, resilience refers in particular to moments of crisis or shock and includes a possible strengthening or flourishing after the crisis. In principle, however, three different approaches to resilience can be identified: Resilience as the ability to withstand shocks and return to a normal state, resilience as a process of adaptation and further development and resilience as the ability

to anticipate potential dangers (cf. Duchek, 2020, pp. 216-219). Furthermore, the concept of resilience can be differentiated as a characteristic (a), resources/resilience potentials (b), capabilities (c), processes or mechanisms (d) or as results (e) (cf. Rätze et al., 2021, p. 629).

According to Horn (1997), organisational resilience describes the ability of systems to withstand environmental pressure situations through a combination of structural components, their connections and the transfer of environmental changes throughout the entire system. This forms the basis of the resilience engineering approach, which focuses on the output, the resilient performance, and not on the process of adaptation. Seville's (2009) approach also focuses on resilient performance as the result of an organisation's ability to protect itself from the negative consequences of stresses or to prevent them from worsening and to recover from them (cf. Hoffmann, 2017, p. 79). These resilience approaches can be summarised under "performance"oriented approaches to organisational resilience (cf. Hoffmann, 2017, p. 80).

The concept of adaptive resilience according to Bristow and Healy (2014), on the other hand, moves away from the idea of a state of equilibrium and focuses on the ability of systems to react dynamically to changes and shocks within a rapidly and suddenly changing environment by adapting. This is justified by the fact that in dynamically changing environments, a return to the normal state is not desirable, as these environmental changes are not taken into account, which in turn can weaken the resilience of the system under observation (cf. Bristow, Healy, 2014, p. 94 and Tillack, Hornbostel, 2022, p. 86). The conceptualisation of resilience as a process aims to identify those elements of the resilience process that help to open the black box between the resources of resilience (input) and the results of resilience (output). Furthermore, they assume that resilience goes through several repetitive mechanisms and develops from one crisis to the next. In this context, Sutcliffe and Vogus (2003) defined organisational resilience as the process by which organisations continuously achieve desirable outcomes despite adversity. They argued that resilience at the organisational level is based on processes that promote competence, support the recovery of effectiveness and drive growth. Furthermore, various conceptual frameworks were proposed that show how organisations could use different cognitive, contextual and behavioural processes to develop resilience resources in stable times, anticipate critical changes, understand and develop solutions to adverse events, and reflect on these events to ensure long-term sustainability (cf. Rätze et al., 2021, p. 623).

Duchek (2020) conceptualises organisational resilience as a meta-competence consisting of the phases of anticipation, reaction and adaptation (cf. Duchek, 2020, p. 215). According to Duchek (2020), the resilience process follows the three temporal stages of anticipating potential threats (1), dealing with/reacting to and during the crisis (2) and adapting/ possibly transforming after the crisis event (3). In each phase of this process, a system must apply certain skills to build resilience.

The conceptualisations of resilience as an ability are also not homogeneous, but can sometimes have different emphases. While most studies understand resilience as the ability to be resistant to disruptions and to recover after these disruptions, there are also conceptualisations that focus on the further development of necessary skills (see Lengnick-Hall et al., 2011; Vogus, Sutcliffe,

2007). Both orientations can also be differentiated in terms of whether they include the aspect of anticipation (cf. Rätze et al., 2021, pp. 622). In some studies, resilience is also conceptualised as a combination of different organisational skills and routines: Lengnick-Hall and Beck (2005; 2016), among others, have pointed out that an organisation's resilience capacity consists of a unique combination of cognitive capabilities (e.g. mental processes and conceptual orientation), behaviours (e.g. honed and rehearsed actions) and contextual factors (e.g. interpersonal relationships and resources) (cf. Rätze et al., 2021, p. 623). For the specific case of local authority resilience, Tillack and Hornbostel (2022) draw heavily on the findings of innovation research and conceptualise resilience as a two-pillar model consisting of the local authority's capacity for innovation (pillar 1) and its ability to act (pillar 2). These two pillars are in turn made up of different capabilities, resources and characteristics, which refine the analytical framework. Innovative capability is understood here as the interplay of a knowledge base (human capital and complexity capital) and knowledge linkage (structural capital and relationship capital). Municipal capacity to act, in turn, is made up of the areas of governance (decision-making competence and agility), motivation (willingness to change and sensitivity) and resources (financial resources and infrastructure) (cf. Tillack, Hornbostel, 2022, pp. 87).

Defining the analytical focus of the concept for the case at hand represents the first step in the further conceptualisation of municipal resilience.

4 **Definition of municipal resilience**

In order to create a conceptual basis and conceptual clarity for answering the research question of how internal and external collaborations strengthen the resilience of municipalities, it is first necessary to define this municipal resilience. Building on this, the next step is to develop a suitable concept in which the functions of internal and external collaborations to ensure the provision of municipal services are analysed.

As already described in the previous chapter, resilience can be viewed from different perspectives, mostly as the ability to withstand shocks and return to a normal state (output orientation), as a process for adaptation and further development (process orientation) and as a competence for anticipating potential dangers, coping with the moment of shock and adapting to the changed context (capacity orientation) (cf. Duchek, 2020, pp. 216-219).

The following comparison of different definitions of resilience focuses especially on organisational resilience of local authorities. The organisational perspective is adopted in this article because, according to Lee et al. (2013), organisational resilience of local authorities is the basis for the resilience of the local community, as the latter is dependent on the performance of the organisations to react and adapt to crisis events. Organisational and community resilience are therefore two sides of the same coin (cf. Lee et al., 2013, p. 29). Local authorities must be resilient due to the complex problems they face, as they must respond to the needs of the affected social groups, which are particularly affected by the effects of these changes, especially in the event of crises and aversive disruptions (cf. Profiroiu, Natsacă, 2021, p. 101 and Engle, 2011, pp. 648-649). Haraguchi (2020) also describes this specifically for local authorities: "Thus, enhancing the resilience of municipal governments is critical for community resilience" (Haraguchi, 2020, p. 789).

In addition to organisational resilience, the concept of urban resilience, which focuses in particular on the socio-ecological and socio-economic systems of the city, is also currently being increasingly discussed, especially at a local level. However, this special form of social resilience will not be discussed further in this article, as many aspects of it are particularly applicable to larger cities, but not to smaller municipalities. However, as local authorities always operate in urban or rural contexts, an understanding of the concept of urban resilience is necessary in order to understand the organisational resilience of local authorities. In one of the first definitions of organisational resilience, Horne and Orr (1998) describe it as a quality "(...) to respond productively to significant change that disrupts the expected pattern of event without engaging in an extended period of regressive behaviour" (quoted by Duchek, 2020, p. 218). This places a clear focus on organisational performance in the context of a rapid response to disruptive events. In his definition of organisational resilience, Robert (2010) also focuses on maintaining or restoring an acceptable state for the organisation as a result of resilience (cf. Duchek, 2020, p. 219). A similar definition can also be found in Holling (1996), among others, who describes resilience as the ability of a system to withstand shocks and quickly return to its pre-shock state or to a stable equilibrium. This definition emphasises that the faster a system stabilises again after a shock, the greater its resilience. Hill, St. Clair and Wial (2011) also follow this line when they define resilience as the ability of a regional or metropolitan economy to maintain or restore a previous state despite external shocks (cf. Bristow and Healy, 2014, p. 94). From an empirical point of view, however, this definition is problematic in that it only allows for an empirical investigation ex-post, i.e. after a disruptive event, but not ex-ante. This means that resilience can only be measured once an aversive event has occurred and the system under investigation has already been exposed to it. This represents a major challenge for the practical research process, as it significantly limits the time available for an empirical study and also restricts access to the field, as it can be assumed that organisations tend to be reluctant to accept scientific support due to the challenge of coping with the aversive event. Furthermore, in the present case, the concept of resilience should be based on a definition that also allows for an ex-ante investigation, so that it can be applied to future research agendas and can also provide a practical benefit for the communities under investigation.

Bristow and Healy move away from this idea of a desirable state of equilibrium and explicitly base their processual concept of adaptive resilience on the theory of adaptive complex systems. Accordingly, resilience is not seen as a return to normality, but as a dynamic, evolutionary ability to adapt to stresses and challenges (cf. Bristow and Healy, 2014, p. 94). In a more complex definition, but also taking into account the processual nature of resilience, Hoffmann (2017) defines it as "(...) the complex result of the interaction of resources, competencies and performances of an individual, intersubjective and organisational nature, as a result of which differentiated resilience is continuously developed in interaction with the environment in the

face of specific events that endanger the organisational identity or permanent existing unfavourable environmental conditions, thus securing the long-term existence of an organisation as a social system through appropriate situational adaptation and also enabling its further development" (Hoffmann, 2017, pp. 97-98). Another resilience process according to McManus (2008) distinguishes in its definition between the process steps of situation analysis by the organisation, the management of important vulnerabilities and the ability to adapt to a dynamically changing environment (cf. McManus, 2008, p. 23). However, according to Hillmann and Günther (2021), the definitions and conceptualisations of resilience as a process have two decisive disadvantages: Firstly, this perspective leaves open how exactly these processes take place ("black box"), and secondly, as with the output orientation, resilience can only be assessed ex-post, i.e. after such a process has taken place, but not ex-ante, i.e. before a disruptive event (cf. Hillmann, Günther, 2021, p. 8). This applies in particular to those definitions and concepts that only describe behavioural elements during the resilience process, but not the necessary characteristics and capabilities that an organisation must possess during the resilience process. However, process-based definitions also offer a major advantage: they focus on a temporal sequence/process, which is a key variable in all aversive events.

The last resilience perspective presented here is that of competence orientation. Here too, a variety of different definitions and conceptualisations can be identified. Based on the concept of temporal phases, which distinguishes between necessary organisational competencies before an extreme event, during an extreme event and after an extreme event, Duchek defines organisational resilience "(...) as an organisation's ability to anticipate potential threats, to cope effectively with adverse events, and to adapt to changing conditions" (Duchek, 2020, p. 220). Resilience is seen here as a meta-competence of an organisation, which can be divided into the ability to adapt (before an extreme event), the ability to cope (during an extreme event) and the ability to adapt (after an extreme event) (cf. Duchek, 2020, p. 224). One of the most frequently cited definitions of resilience as a competence is that of Lengnick-Hall et al. (2011), who define organisational resilience as "(...) a firm's ability to effectively absorb, develop situation-specific responses to, and ultimately engage in transformative activities to capitalize on disruptive surprises that potentially threaten organisation survival" (Duchek, 2020, p. 219). Based on this definition, Lengnick-Hall et al. (2011) identified several behavioural, contextual and cognitive factors that create a suitable framework, especially at the analytical level, as these can be adapted depending on the organisation under investigation and allow an ex-ante assessment of these factors. These include meaningfulness, sense of purpose, shared core values and vision (cognitive factors), resourcefulness, habitual practices and behavioural preparations, but also behaviours that lead to non-compliant strategic actions (behavioural aspects) and also psychological security, deep social capital, distribution of power and accountability (contextual factors) (cf. Lengnick-Hall et al., 2011, pp. 245-247). A resilience perspective based on competencies can be particularly interesting for small municipalities, as it can be used to derive selfassessment factors that allow small municipalities to assess their own resilience even without large financial and human resources and to take appropriate organisational measures, which are

easier to implement than in larger cities, particularly due to the size of the municipal administration. In contrast to a performance-orientation, a competence-orientation can also be assessed in advance (ex-ante) and, unlike purely process-orientated approaches, does not require complex and in-depth management systems.

Duchek (2020) provides an overview of various definitions of organisational resilience, which distinguish between the following resilience perspectives: resilience as resistance and recovery, resilience as adaptation and resilience as anticipation (cf. Duchek, 2020, p. 218).

Resilience is understood as	Author(s)	Year	Resilience concept	Definition
Resistance and recovery	Horne and Orr	1998	Organizational resilience	"Resilience is a fundamental quality () to respond productively to significant change that disrupts the expected pattern of event without engaging in an extended period of regressive behavior" (p. 31)
	Linnenluecke et al.	2012	Organizational resilience	Resilience is the "organizational capacity to absorb the impact and recover from the actual occurrence of an extreme weather event" (p. 18)
	Boin and Eeten	2013	Recovery resilience	Recovery resilience means "bouncing back to a state of normalcy" (p. 431)
Adaptation	Reinmoeller and van Baardwijk	2005	Resilient companies	Resilience is "the capability to self-renew over time through innovation" (p. 61)
	Vogus and Sutcliffe	2007	Organizational resilience	Resilience is "the maintenance of positive adjustment under challenging conditions such that the organization emerges from those conditions strengthened and more resourceful" (p. 3418)
	Lengnick- Hall et al.	2011	Organizational resilience capacity	Resilience is a "firm's ability to effectively absorb, develop situation-specific responses to, and ultimately engage in transformative activities to capitalize on disruptive surprises that potentially threaten organization survival" (p. 244)
Anticipation	Somers	2009	Organizational resilience potential	Resilience "is more than mere survival; it involves identifying potential risks and taking proactive steps () to ensure that an organization thrives in the face of adversity" (p. 13)
	Boin and Eeten	2013	Precursor resilience	Precursor resilience "prevents budding problems from escalating into a full-blown crisis or breakdown" (p. 431)
	Ortiz-de- Mandojana and Bansal	2015	Organizational resilience	Resilience is "the incremental capacity of an organization to anticipate and adjust to the environment" (p. 6)

Figure 3: Overview of resilience perspectives and definitions (source: Duchek, 2020, p. 218).

It was shown that there is no universally valid definition and concept of organisational resilience, but that it must always be considered with regard to the context and the corresponding object of research. With regard to the resilience of public institutions, Profiroiu and Nastaca (2021) found that most definitions of social resilience refer to private organisations, local communities, regions or economic systems, but not to public institutions such as local authorities (cf. Profiroiu and Nastaca, 2021, p. 105).

However, with regard to the research question and the intended research outcome of this article, the descriptions of the various definitions of resilience given in this chapter allow us to identify a number of general competences that are particularly relevant for small municipalities due to their competence orientation and also provide a suitable conceptual framework for further analysis of the beneficial effects of internal and external partnerships on the resilience of municipalities:

Resilient systems are characterised by their ability to absorb shocks (absorptive capacity), i.e. to maintain core functions and structures, to adapt to changing environmental conditions (adaptive capacity) and, if necessary, even to make profound changes in the sense of a transformation (transformative capacity) (cf. Profiroiu, Nastacă, 2021, p. 105).

Elston and Bel (2023) already make a distinction between adaptive and absorptive resilience, whereby in this case absorption is seen as a necessary capability during the coping phase of an extreme event, while the ability to adapt is always applied in the learning phase following an aversive event, so that new capabilities are developed on the basis of the aversive event (cf. Elston, Bel, 2023, p. 736). According to Sheffi (2007), resilient communities are also characterised by the fact that they are able to react to smaller disruptive changes with a high probability of occurrence (small scale disruptions) by means of the described characteristics, but that they also have a supportive effect when more serious, less probable changes (large scale disruptions) occur (cf. Hoffmann, 2017, p. 80). This definition and the resilience competences of absorption, adaptation and transformation capabilities derived from it now form the basis for the concept of municipal resilience to be developed, especially for small municipalities.

5 Conception of municipal resilience

Based on the definition of municipal resilience formulated in the previous chapter, the following section proposes a conceptualisation of resilience that makes it possible to make concrete statements about the potential influence of internal and external collaborations on this conceptualisation. This is the aim of this chapter.

The skills of absorption, adaptation and transformation derived from the definition of resilience form the basis for this. This competence-oriented approach is supplemented by a temporal process framework due to the conceptual added value. The analytical framework for this is the temporal resilience process according to Duchek (2020). This takes into account the dynamic

nature of aversive events and does not conceptualise communal resilience as a skill that only manifests itself after such an event, but rather as a multi-dimensional construct that determines different aspects of behaviour, skills and characteristics before, during and after an aversive event.¹

Within these three temporal phases, a community needs those aspects of behaviour, skills and characteristics that correspond to the nature of the respective phase.



Figure 4: Phase model of municipal resilience (source: own illustration based on Duchek, 2020, p. 224).

These necessary behavioural aspects, skills and characteristics can already be derived from the underlying definition, namely the ability to **absorb**, **adapt and transform**. According to the findings of Engle (2011), transformative capacity should not be considered as a single factor in a resilience model, but rather as part of adaptive capacity. The higher the adaptive capacity of a system, the greater the probability of achieving a desirable state after the change event. This can include a transformation of certain system elements or a return to the initial state (cf. Engle, 2011, p. 650f.). The result of such an adaptation or transformation is the maintenance of organisational processes and structures as well as the organisational identity despite the aversive event. The ability to absorb and adapt are therefore the decisive capabilities for producing the public good of "communal resilience".

¹ The term "aversive event" refers to an event that poses a threat to the maintenance of organisational structures, processes and identity and thus poses a threat to organisational survival (see Raetze et al., 2021, p. 608 or Hoffmann, 2017, p. 90).

However, these necessary behavioural aspects, skills and characteristics do not exist in a vacuum, but are influenced by various factors in all three resilience phases, depending on the context, which in turn influence the resilience of the affected municipality. Lengnick-Hall et al. (2011) have already identified psychological safety, deep social capital, distribution of power and accountability as well as broad resource networks as the decisive contextual factors (cf. Lengnick-Hall et at., 2011, p. 247).

A conceptualisation of municipal resilience based on the two capabilities of absorption and adaptation is based on a solid theoretical foundation: As already described in Chapter 1, the concept of resilience is derived from the theory of complex adaptive systems. These systems react to disturbances from the environment in such a way that they produce emergent behaviour in the form of adaptive and dynamic performance. In relation to our case of municipalities, this means that local authorities must be able to produce adaptations and dynamic capabilities in response to aversive events. According to Veit et al. (2019), these dynamic capabilities can be understood with regard to public administrations as those capabilities that allow the administration to systematically acquire new knowledge, whereby the absorption of this knowledge is of crucial importance (cf. Veit et al., 2019, p. 709f.). Zahra and George (2002) also describe absorption as the ability that produces dynamic capabilities for the permanent generation and use of knowledge through its acquisition, adaptation, transformation and utilisation (cf. Puggel, 2012, p. 48).

The embedding of the conceptualisation of municipal resilience in the theory of complex adaptive systems can be represented graphically as follows:



Figure 5: Embedding the concept of municipal resilience in the theory of complex adaptive systems (source: own illustration).

Absorptive capacity

The organisational absorptive capacity describes the identification of relevant, external knowledge and the ability to subsequently interpret, adapt and also use this knowledge (see Veit et al., 2019, p. 710 and Puggel, 2012, p. 47). This ability has already been described as an important system capability in several concepts and studies on the resilience of social systems (see Hillmann, Günther, 2021 and also Lengnick-Hall, 2011). According to Cohen and Levinthal (1989), an absorption process can be divided into three phases: Identification of relevant knowledge through observation and evaluation of external and internal organisational knowledge; interpretation, adaptation and integration of the identified relevant knowledge against the background of existing change events by combining it with existing knowledge; use and implementation of the now adapted knowledge in organisational processes and routines (see Veit et al. 2019, pp. 710-711 and Puggel, 2012, p. 57).

According to Puggel (2012), organisational absorptive capacity can be subdivided into the factors "recognition of new, relevant knowledge outside the organisation", "absorption of relevant, organisation-external knowledge" and "utilisation of new knowledge". The first step is to "recognise" knowledge that is located outside the organisation, identify it and assess the extent to which it is relevant to the organisation. In the next step, this knowledge is absorbed by the organisation, adapted to its structures and distributed in such a way that it reaches all relevant stakeholders within the organisation. In a final step, this absorbed external knowledge is utilised in such a way that new knowledge is created and implemented in the organisational structures and processes. As a result, an organisation can increase its performance and innovative capacity through such an absorption process (cf. Puggel, 2012, p. 57).

To operationalise these dimensions of absorptive capacity, Puggel (2012) assigns different indicators/items to them (cf. Puggel, 2012, p. 98f.). The following is a list of the operationalisation proposed by Puggel (2012):

Dimension	Subdimension	Operationalisation
Recognising new,	-	Internal: Use of learning programmes/new media
relevant knowledge		External: Analysis and systematic evaluation of
outside the company		customer complaints
		External: Direct contact with customers
		External: Customer survey
		External: Learning through contact with suppliers
		External: Cooperation with critique groups (user
		groups/pressure groups)
		External: Open innovation: utilising the outside
		world for your own innovation processes
		External: Analysis of competitor behaviour
		External: Information search on the intranet, inter-
		net or knowledge platforms
		External: Reading specialised journals

We almost always gain a market advantage through new procedures, methods or manufactur-
ing processes.

Figure 6: Model of organisational absorptive capacity (source: own illustration based on Puggel, 2012, p. 98f.).

If we now apply this model of organisational absorptive capacity to the temporal phase model of resilience, we can see that the dimensions of absorptive capacity are used in all three phases, but are aligned differently.

In phase 1, municipalities must absorb external knowledge in such a way that they can already anticipate upcoming aversive events and prepare for them in the best possible way. This does not mean that municipalities can accurately predict or even avert all upcoming aversive events, but rather that they can already make the necessary preparations to be able to react to these events. According to Duchek (2020), this requires monitoring and identifying as well as preparing for future aversive events (cf. Duchek, 2020, p. 225). On this basis, it can be clearly seen that all dimensions of absorptive capacity are necessary for the development of resilience in this phase. New, relevant knowledge must be recognised in the form of observing critical developments. This must then be absorbed by identifying potential threats and utilised by the municipality through appropriate preparation measures.

According to Duchek (2020), the second phase of the resilience process is characterised by the municipality's acceptance that an aversive event has occurred, which requires an immediate response from the actors involved, and by the corresponding development and implementation of appropriate measures to deal with the situation (cf. Duchek, 2020, p. 227). The aim here is to maintain the performance of municipal tasks and the organisational identity of the local authority despite the aversive event. Here, too, it can be seen that recognising and, in particular, absorbing relevant knowledge is necessary for problem acceptance. This absorption of relevant knowledge expands the local authority's knowledge base, which, according to Tillack and Hornbostel (2022), increases the ability of a local authority to solve complex problems (cf. Tillack, Hornbostel, 2022, p. 89). This absorption of relevant knowledge is subsequently also necessary for the development of meaningful solutions (sensemaking). Through this absorption of knowledge, solutions can be developed that appear meaningful to the actors involved and are checked for their meaningfulness in a constant feedback loop of action and understanding (cf. Duchek, 2020, p. 228). These recurring sensemaking processes are used to generate new knowledge, which is then utilised both for the implementation of the measures developed during the aversive event and for the development of adaptive responses after an aversive event. However, as the initial reactions to aversive events usually have to be made at short notice and without lengthy rounds of coordination with the decision-making departments, the implementation of ad-hoc solutions plays a decisive role in crisis management. This requires fast and flexible utilisation of the newly generated knowledge. According to Tillack and Hornbostel (2022), a municipality's ability to cope increases with its ability to make decisions and implement measures quickly and flexibly (in the sense of agile) (cf. Tillack, Hornbostel, 2022, p. 90).

In the final phase of the resilience process, a local authority must adapt its structures and processes to the changed environment through reflection and learning activities in order to take account of the changes in the local authority's environment caused by the aversive events so that it can fulfil its core tasks despite the changes and, in the best case, optimise its actions (cf. Duchek, 2020, p. 230). For these reflection and learning activities, the relevant knowledge must be recognised and recorded using appropriate methods. The ability of a municipality to transfer relevant knowledge to the appropriate places within and outside the administration also increases its ability to innovate (cf. Tillack, Hornbostel, 2022, p. 89). However, this knowledge must also be utilised, particularly for the adaptation of organisational structures and processes in the context of organisational change. This shows that all dimensions of absorption are also necessary in this phase, but the focus is particularly on the utilisation of the relevant knowledge.



Figure 7: Absorption in the temporal resilience process (source: own illustration).

Figure 7 clearly shows that **specific behavioural aspects** for resilient action can already be derived from the absorptive capacity.

Adaptive capacity

According to Engle (2011), adaptive capacity describes "(...) the ability of a system to prepare for stresses and changes in advance or adjust and respond to the effects caused by the stresses" (Engle, 2011, p. 647). Gupta et al. (2010) take the same line when they write that adaptive

capacity is the ability of a system to adapt to environmental changes, minimise potential damage, take advantage of opportunities or deal with negative consequences (cf. Gupta et al., 2010, p. 461).

Alongside exposure and sensitivity, adaptive capacity is a determining factor of vulnerability and is seen as a critical factor in reducing vulnerability due to its influence on both social and biophysical systems (cf. Engel, 2011, p. 649, and Gupta et al., 2010, p. 460). In resilience research, adaptive capacity is also cited alongside absorptive capacity as a determinant of resilience (see Profiroiu, Natsacă (2021), Brian Walker et al. (2004), Lorenz (2013), Hoffmann (2017), Bristow, Healy (2014), McManus et al. (2008)). Adaptive capacity thus represents the connecting element between these two concepts, which can be explained in particular by the characteristic of uncertainty, which, derived from the complex adaptive systems theory, represents a system effect that influences both the vulnerability and the resilience of systems. Against this background of uncertainty, adaptation can be seen as the necessary ability of systems to mobilise required resources, anticipate change events and react to them accordingly. Adaptive capacity is a system characteristic that allows the systemic actors to control and influence resilience, as adaptive capacity initiates communication between the actors and the environment, which allows the system to react resiliently to change events (cf. Engle, 2011, p. 648).

In addition, Engle (2011) also characterises adaptability as a factor that promotes transformation. If the original state of a system represents an undesirable state, adaptive capacity can help to transform this state. Transformation capability therefore does not have to be considered as a single factor in a resilience model, but as part of adaptive capacity. This can include a transformation of certain system elements or a return to the initial state (see resilience engineering) (cf. Engle, 2011, pp. 650-651). For example, if the organisational identity is also desirable before the change phenomenon, it should not be transformed in the course of adaptation.

Based on the question of which characteristics institutions must have in order to strengthen the adaptive capacity of the social system society, several indicators were developed in the aforementioned work by Gupta et al. (2010), which are divided into six dimensions and in their entirety represent an assessment tool for adaptive capacity, the "adaptive capacity wheel". This instrument consists of the six dimensions "variety", "learning capacity", "room for autonomous change", "leadership", "resources" and "fair governance". A total of 22 criteria are assigned to these dimensions (cf. Gupta et al., 2010, p. 462). The "variety" dimension describes the acceptance of diversity in terms of solutions and strategies. This diversity creates a counter-concept to the widespread approaches of efficiency, rationalism and performance-orientated management and is intended to motivate stakeholders to work creatively on customised solutions. However, an exaggerated focus on diversity can also have a paralysing effect, which is why it is necessary to embed this dimension in a defined framework. Gupta et al. create this framework using the attached criteria. The dimension of "learning capacity" is based on the concepts of social learning (Wenger, 1998), human learning (Ormond, 1999) and the ability to experiment (Walker et al., 2002). The evaluation criteria of this dimension are trust among the actors, the assumptions of exploitative and explorative learning, the explicit consideration of uncertainties and doubts as well as the promotion of institutional memory. In the third dimension of the model ("room for autonomous change"), institutions enable actors to adapt their behaviour autonomously to changing environmental conditions. To this end, actors must be empowered to anticipate changes in the environment and plan preventive measures by providing the necessary information and resources. Assessment criteria for this dimension are continuous access to information, the ability to improvise and the ability to follow plans. Leadership allows institutions to implement change, set future directions and motivate actors to follow the guidelines. The assessment criteria for this dimension are based on three elements of leadership that promote adaptability. These are visionary leadership (see carrot and stick), entrepreneurial leadership (see leadership by example) and collaborative leadership (see instrumental leadership) (cf. Gupta et al., 2010, p. 463). Effective action by institutions is usually linked to their ability to mobilise financial, human, technical and legal resources to change norms and rules and to implement these changes. However, this ability is always dependent on the context in which an organisation operates. In addition to authority, the assessment criteria for this dimension also include financial and human resources. The last dimension of the Adaptive Capacity Wheel is "fair governance". This refers to the sensible use of resources through a balance of efficiency and effectiveness. Even though innovation processes usually have a very low level of efficiency, their implementation is of great importance for institutions in order to optimise their development. In this context, governance that is considered equitable is understood as legitimised governance that bases its actions on fair, transparent and responsive processes that are aligned with the needs of society and clearly assign accountability and responsibility. For this reason, the evaluation criteria for these dimensions are made up of accountability, responsiveness, justice and legitimacy (cf. Gupta et al., 2010, p. 464).



Figure 8: Model for the promotion of social adaptability by institutions (Adaptive Capacity Wheel) (Source: Gupta et al., 2010, p. 464).

If we now apply this model of adaptive capacity to the temporal phase model of resilience in the same way as the model of absorptive capacity, we can also see that the adaptive capacity factors apply in all three phases, but that the number of necessary adaptation factors increases over the course of the resilience process.

The availability of sufficient financial, human, technical and legal resources, in addition to governance based on a sense of responsibility (see fair governance), are contextual factors for resilient behaviour by organisations, which are applied in all phases of the resilience process. These contextual factors are described in more detail later in the chapter.

In terms of monitoring and identifying potentially aversive events and preparing for them, a certain amount of room for autonomous change enables local authority actors to anticipate changes in the environment and plan preventive measures through continuous access to information. This factor is crucial for adapting to this phenomenon of change triggered by the aversive event.

With regard to coping with the aversive event in the second phase of the resilience process, the scope for self-determined change can also enable local authority stakeholders to strengthen their ability to improvise with regard to the development and implementation of meaningful ad-hoc measures while at the same time being able to follow plans. In addition, promoting diversity within the administration can encourage acceptance of problems, as this also strengthens openness to potentially problematic change events. Strengthening and promoting diversity can also motivate local authority stakeholders to work creatively on customised and meaningful ad-hoc solutions.

The factor of room for manoeuvre for self-determined change can also have a beneficial effect in the phase following an aversive event, as it strengthens the possibility of adapting to the changed environmental conditions by increasing the scope for action (flexibility). The organisational learning capability, which is characterised by a balance of explorative and exploitative learning methods, is an important factor in the implementation of organisational change processes and the necessary learning activities in the aftermath of an aversive event. Explorative learning is defined here as the optimisation of existing structures and processes by increasing efficiency, while explorative learning describes transformations through experimentation, innovation and a willingness to take risks (cf. Duit, Galaz, 2008, p. 320). The term ambidexterity describes precisely this balance of exploitative and explorative learning activities (cf. Veit et al. 2019, pp. 711-712). Furthermore, the leadership factor also plays an important role, as it makes it possible to motivate employees to follow a shared vision and implement processes of organisational change. According to Tillack and Hornbostel (2022), the ability to develop and implement innovative measures increases as the willingness to change and sensitivity to risks and challenges of a municipality increases (cf. Tillack, Hornbostel, 2022, p. 90). In addition, a visionary and motivating leadership culture is also of decisive importance with regard to the actual implementation of the necessary adaptation measures identified in the reflection.



Figure 9: Adaptation in the temporal resilience process (source: own illustration).

Figure 9 shows that **properties and capacities** can be derived from the adaptive capacity, which support the specific **behavioural aspects** of absorption in the resilience process.

Contextual factors

According to Lengnick-Hall et al (2011), an organisation's ability to respond effectively to complex environmental conditions is significantly influenced by certain contextual factors that exist both inside and outside the organisation. Lengnick-Hall and Beck (2003, 2005) identified four key contextual conditions that support resilience: psychological safety, deep social capital, power sharing and accountability, and broad resource networks. These factors foster interpersonal connections and ensure the supply of resources that enable organisations to act quickly under uncertain and surprising conditions. **Psychological safety** refers to how people perceive their work environment in relation to risks such as asking questions, seeking information, asking for help, admitting mistakes or giving critical feedback. When psychological safety is ensured, employees are more willing to take these risks, which is crucial for an organisation's resilient response. **Deep social capital**, which results from respectful interactions within an organisation, promotes information sharing, resource transfer and cross-functional collaboration. This form of capital helps to build a supportive community that enables the organisation to build bridges and create a network of support and resources. In this sense, Hillmann and Günther (2021) also identified networks as a protective factor in times of crisis (cf. Hillmann, Günther, 2021, p.33). This also includes internal and external collaborations between local authorities, which are discussed separately in the following chapter. The **distribution of power**, which is not hierarchical but based on self-organisation and individual responsibility, and the **duty of accountability**, enables a flexible response to change. Such an organisational structure promotes learning and adaptability, as decision-making powers are widely distributed and each member bears responsibility for the well-being of the organisations. Through relationships with external actors, organisations can secure important resources and expand their scope for action, which promotes innovation and critical thinking. Overall, these contextual conditions form the basis on which resilient behaviours and attitudes can be developed. While they alone are not sufficient to guarantee resilience, they are an essential component that enables the development of resilient behaviour and the building of an organisational resilience capability (cf. Lengnick-Hall et at., 2011, p. 247).

To summarise, it can be said that in all three resilience phases, different aspects of a local authority's absorptive and adaptive capacity are required to develop the meta-capacity and production of the public good "municipal resilience", which is supported by several contextual factors across all phases.

In phase 1, prior to an aversive event, a local authority must act in the spirit of absorption by

- recognises new, relevant knowledge in the form of observing critical developments (behaviour),
- identifies potential threats by incorporating this relevant knowledge (behaviour) and
- develops and implements appropriate preparatory measures through the utilisation of knowledge (behaviour).

These acts of absorption are characterised by the property of the

• continuous access to information for local authority stakeholders (property)

This is supported and supplemented by the local authority, which can anticipate critical environmental changes and plan preventive measures.

Even when coping with an aversive event, a local authority needs different aspects of absorption and adaptation in order to be able to react appropriately to the event. In this phase, local authorities must

- recognise and absorb relevant knowledge in order to accept the problematic aversive event (behaviour),
- develop meaningful solutions by absorbing knowledge (behaviour) and
- implement these solutions on an ad-hoc basis by exploiting the knowledge (behaviour).

These behavioural aspects are supported by

- a basic attitude of openness to problem acceptance (property),
- redundant provision of important resources required for crisis management (property),

- sufficient capacity for improvisation (capacity),
- diverse solution proposals and redundant resources for the development of ad-hoc measures (property),
- but also by the capacity to follow the coping plans already developed (capacity).

In the third phase of the resilience process, local authorities face the challenge of adapting their structures and processes to the changed environment caused by the aversive event. Relevant knowledge in this regard must be

- recognised and recorded in order to carry out reflection and learning activities (behaviour) and
- this newly generated knowledge can be utilised in the context of organisational change (behaviour).

The adaptability of a local authority supports these processes to the extent that

- there is greater room for manoeuvre due to flexibility (property),
- a balance of exploratory and exploitative learning methods is achieved (capacity) and
- collaborative and visionary leadership styles are applied to implement the developed adaptation measures (capacity).

However, the behavioural aspects, properties and capacities identified and described here are not to be understood as exclusively and solely relevant to the respective phase of the resilience process. Rather, these are factors that are necessary conditions for producing the public good of "municipal resilience", particularly in the phases assigned to them. However, this does not mean that these factors are not also important in the other phases of the resilience process. For example, the characteristic of flexibility is a necessary condition for adapting in the aftermath of an aversive event, but can also have a supportive effect on coping with aversive events. Also, the property of openness is not only beneficial during an aversive event, but can also promote resilience even before such an event in the sense of openness to alternative futures and curiosity about developments in the local environment. The individual factors should therefore not be viewed strictly separately from one another, but rather as part of the overall picture of the complete resilience process.

Each of these behavioural aspects, properties and capacities in the three resilience phases are further influenced by the level of psychological security of the local authority's employees, the quality of social capital, the distribution and balance of power and the existing resource networks within and outside the local authority. This descriptive list of the required absorption, adaptation and context factors clearly shows that they are complementary and that the adaptation factors in particular have a supporting effect on the absorption factors for each phase. For example, if we take a closer look at the skills required in the first phase of the resilience process, we can see that continuous access to information supports the recognition of critical developments, the absorption of knowledge about potential threats and the utilisation of knowledge for preparation. In the other phases of the resilience process, the factors of absorptive capacity also describe specific actions that are supported by the factors of values and characteristics of adaptive capacity.

Throughout the resilience process, the aspects of absorptive and adaptive capacity are strengthened and promoted by the factors of psychological safety, deep social capital, power sharing and accountability, including through broad resource networks.



Figure 10: Graphical representation of the conceptualisation of municipal resilience (source: own illustration, see also Duchek, 2020, p. 224 and Gupta et al., 2010, p. 464).

6 Collaboration in the resilience process

Within the analytical framework of the multi-dimensional concept of municipal resilience presented in the previous chapter, this chapter will now focus specifically on answering the research question of how internal and external collaborations strengthen the resilience of municipalities. The potential influence of internal and external collaborations is identified and described using the phase model of municipal resilience and the identified supporting behavioural aspects, characteristics and capabilities derived from the capacity to absorb and adapt². As these collaborations describe the context in which the common good "community resilience" is produced, we can find aspects of this in all phases of the resilience process. Collaboration describes the cooperation of an actor with at least one other actor from within the organisation (internal collaboration) or from outside the organisation (external collaboration) to develop solutions that allow all parties involved in the collaboration to achieve their respective goals (cf. Naidoo, Sutherland, 2016, p. 75). As a result of these theoretical considerations, a catalogue of working hypotheses was developed on the possibilities for promoting internal and external collaboration on the resilience of a local authority, which can serve as a research agenda for future empirical work.

6.1 Phase 1: before an aversive event

Behaviour: Observation of critical developments

Based on the concept of organisational absorptive capacity according to Puggel (2012), a local authority must monitor its environment in such a way that it can observe external knowledge in relation to possible critical developments and assess its relevance for the local authority. External collaboration can have a particularly supportive effect here, as such knowledge can be gained through collaboration with customers and the local private sector, targeted exchange formats with citizens, participation in expert panels or municipal partnerships, bilaterally or in networks (cf. Puggel, 2012, p. 98). A continuous formal and informal exchange of knowledge and information with relevant stakeholders outside of local authority is therefore crucial in order to be able to monitor critical external developments.

Working hypothesis 1: Formal and informal external collaborations with relevant stakeholders to share knowledge and information will support the monitoring of critical developments prior to an aversive event.

Behaviour: Identification of potential threats

As part of the identification of potential threats, a local authority must record the knowledge assessed as relevant and distribute it within the organisation to the affected departments. This requires in particular internal formal and informal collaborations, such as exchange formats in project groups, cross-hierarchical and cross-departmental working groups or an informal, collegial exchange of experience between local authority employees during and outside of working hours (cf. Puggel, 2012, p. 99). Through these internal collaborations, relevant knowledge about

² In this case, internal and external collaborations are categorised under the context factor "social capital", as this refers to formal and informal exchange processes between at least two different actors.

critical developments outside the local authority can reach those parts of the administration where potential threats can be identified.

Working hypothesis 2: Formal and informal internal collaborations for knowledge and information sharing will support the identification of potential threats prior to an aversive event.

Behaviour: Preparation for aversive events

In order to prepare for future aversive events, it is now the task of a local authority to generate new knowledge from the identified and absorbed external knowledge and to adapt this to the processes and structures of the administration. This requires both internal and external collaboration. Within a local authority, the individual departments must work together to ensure that the structures and processes are adapted on the basis of the new knowledge. Collaboration between the central administration and the specialised departments is particularly important for this. Collaborations can also support preparation for aversive events in the external dimension if, for example, solutions, tools or methods from other municipalities, authorities or the private sector are utilised by the municipality (cf. Puggel, 2012, p. 99).

Working hypothesis 3: Formal and informal internal collaboration formats between the central administration and the specialist departments of a local authority to optimise organisational management strengthens preparation for aversive events

Working hypothesis 4: Formal and informal external collaborations between a local authority and external stakeholders to share best practice examples of crisis prevention improve a municipality's preparedness for aversive events.

Property: Continuous access to information

This absorption process by a local authority prior to an aversive event is strengthened by the adaptive property of continuous access to information to the effect that individual and organisational early warning systems are established and all members of the organisation have access to the organisational knowledge base (cf. Gupta et al., 2010, p. 462). Formal internal collaborations are particularly necessary for this, such as the interdepartmental exchange of monitoring data and organisation-relevant information or institutionalised exchange meetings between the various departments and employees.

Working hypothesis 5: Formal internal collaborations for low-threshold data exchange strengthen administrative staff's continuous access to information in the run-up to an aversive event.

6.2 Phase 2: during an aversive event

Behaviour: Problem acceptance

Internal and external collaborations can also have a supportive effect in the context of problem acceptance during an aversive event. In the external dimension, collaboration with peer groups in the form of municipal partnerships, networks and bilateral specialist collaboration can contribute to the acceptance of a problem as such by a local authority, as it is recognised that it is also classified as problematic by other local authorities. In addition, internal cross-hierarchical and cross-departmental exchange formats can also increase the density of information and diversity of perspectives on a specific problem situation, which can increase the acceptance of a problem.

Working hypothesis 6: Formal and informal intermunicipal collaboration formats at the beginning of an aversive event strengthen the problem acceptance of a local authority.

Working hypothesis 7: Formal and informal intra-municipal collaboration formats at the beginning of an aversive event strengthen the problem acceptance of a local authority.

Behaviour: Ad-hoc implementation of solutions

As the initial response measures in crisis management usually have to be carried out ad-hoc and without a long reaction time due to their dynamic nature, the ad-hoc implementation of these solutions is of great importance. Informal internal and external collaborations make it possible to mobilise the internal and external players required for the initial crisis response promptly and without bureaucratic effort and to implement solutions together for this purpose.

Working hypothesis 8: Informal internal and external collaborations between executive units of a local authority and stakeholders involved in crisis management strengthen the ad-hoc implementation of solutions during an aversive event.

Behaviour: Development of sensible solutions

Following the initial crisis response, meaningful solutions must be developed by the stakeholders to deal with the aversive event. The development of meaningful solutions during an aversive event can be supported externally, particularly through collaboration with other municipalities, as similar starting points and needs exist, resources can be pooled and synergies can be generated. According to Elston and Bel (2023), inter-municipal collaboration in the coping phase strengthens absorption capacity by exchanging resources and information between organisations (cf. Elston, Bel, 2023, p. 738). External collaborations with other stakeholders, such as the private sector, civil society and research institutions, can also have a supportive effect here, as new knowledge, technical expertise and perspectives are gained, which can support the development of creative and meaningful solutions. Internal collaborations are necessary in the development of meaningful solutions during an aversive event, particularly in the form of institutionalised feedback loops between the decision-making and implementation units of the solutions, as this allows information to be exchanged between these two units and the solutions can thus be continuously checked for their meaningfulness.

Working hypothesis 9: Formal external involvement of external stakeholders by the local authority during an aversive event strengthens the development of meaningful solutions.

Working hypothesis 10: Formal internal feedback formats between decision-making and execution units of a local authority during an aversive event strengthen the development of meaningful solutions.

Capacity: Following plans

In order to implement these developed meaningful solutions, a local authority requires the adaptability of the plan tracking, i.e. the developed, planned solutions must also be implemented by the implementation units (cf. Gupta et al., 2010, p. 462). Depending on which stakeholders are involved in the developed plans, a local authority needs internal or external collaborations to implement these plans. Formalised collaborations are particularly important here, as they are carried out within a framework agreed in advance by the collaborating parties and there is a common understanding of the objectives, content, structures and processes of this collaboration.

Working hypothesis 11: Formal internal and external collaborations between actors included in the crisis management plans support the local authority to implement already developed plans to cope with an aversive event.

Capacity: Improvisation

However, it is often not possible to implement ad-hoc solutions during an aversive event simply by providing institutionalised exchange formats between the decision-making and execution units of a local authority, as execution units usually have to react spontaneously to an aversive event as a first step. In addition to the feedback loops with the decision-making units, the execution units must therefore also have the ability to react flexibly and at extremely short notice to aversive events in order to implement situation-specific direct response options (cf. Gupta et al., 2010, p. 463). Informal internal collaborations between the affected implementation units can increase a local authority's ability to improvise during an aversive event, as this allows the technically competent units to work directly on solving the problem without time-consuming formal coordination formats. Informal external collaborations between the local authority's implementation units and external, usually local, stakeholders can also increase the ability to improvise, as this allows unusual hybrid resources to be mobilised as quickly as possible to deal with the aversive event, such as the accommodation of evacuees in the workshops of a local craft business or the use of boats from the local sailing club during a flood. The more resources

that can be mobilised during the immediate management of aversive events, the more the implementation of developed measures is strengthened (cf. Tillack, Hornbostel, 2022, p. 90).

Working hypothesis 12: Informal internal collaborations between the implementation units of a local authority's crisis management measures outside the usual administrative hierarchy strengthen a local authority's capacity to improvise during an aversive event.

Working hypothesis 13: Informal external collaborations between a local authority and local stakeholders to mobilise unusual hybrid resources strengthen a local authority's ability to improvise during an aversive event.

Property: Variety

This duality of meaningful solution development and implementation between decision-making and execution units and the ability to pursue these plans on the one hand and the ad-hoc implementation of adapted solutions through the ability to improvise on the other is strengthened by the characteristic of diversity within an organisation (dual problem-solving capability). External collaborations with different partners outside the local authority in particular can strengthen this diversity in the provision of services. These so-called "multi-actor" and "multi-sector" partnerships increase a local authority's ability to implement ready-made plans during an aversive event, but also to develop improvised solutions. Within a local authority, cross-hierarchical and cross-departmental collaborations can also strengthen these two problem-solving approaches by increasing knowledge, resources and skills.

Working hypothesis 14: Formal external project collaborations with a variety of partners will strengthen the problem-solving capacity of a local authority during an aversive event in the sense of a duality of plan pursuit and improvisation.

Property: Openness

Through the characteristic of openness, a local authority can create the cultural basis with regard to different opinions, problem definitions and solution approaches of the various stakeholders in the context of the acceptance of the problem that has arisen, the development of sensible solutions and the ad-hoc implementation of these solutions. Similar to the characteristic of diverse actors, sectors and hierarchical levels in the process of service provision or solution development and implementation, internal and external collaborations can sensitise local authorities to different, sometimes congruent, but sometimes also competing problem definitions and solution strategies and thus strengthen their openness in this regard.

Working hypothesis 15: Formal and informal internal and external innovation collaborations strengthen the openness of a local authority with regard to different problem definitions and solution strategies during an aversive event.

6.3 Phase 3: after an aversive event

Behaviour: Reflection and learning activities

Reflection and learning activities in the aftermath of aversive events require both the recognition and absorption of the knowledge generated by the aversive event. Various exchange and evaluation formats within the administration (hierarchical and departmental, but also cross-hierarchical and cross-departmental), as well as with external participants, can contribute to recognising this knowledge and absorbing it at the appropriate points within the administration. These internal and external collaborations can take place in a formalised form, but studies have already shown that informal collaborations between individual employees in particular have a positive influence on learning after aversive events (cf. Duchek, 2020, p. 230).

Working hypothesis 16: Formal and informal internal and external collaborations for the evaluation of crisis management measures strengthen the reflection and learning phase of a local authority in the aftermath of an aversive event.

Behaviour: Organisational change

By means of formal internal administrative collaborations between the departments concerned and the central administration, the structures, processes and actions of the administration can be adapted to the newly acquired knowledge during the reflection and learning phase and thus utilised. These collaborations must not only lead to an adaptation of organisational structures, processes and actions, but also help to overcome potential internal resistance. These internal collaborations can strengthen resilient social relationships and effective communication between individual administrative staff, but also between different departments and within the administration as a whole, which is necessary to ensure that the adaptations developed are also implemented by all those involved and that internal resistance is minimised or overcome.

Working hypothesis 17: Formal internal collaborations between the central administration and the specialist departments of a local authority will strengthen the implementation of learning outcomes in terms of organisational change following an aversive event.

Capacity: Ambidexterity

Ambidexterity describes the ability of an organisation to create a balance between exploitative learning activities, i.e. the optimisation of existing structures, processes and actions, and explorative learning activities, in the sense of innovation developments. The aim is to achieve a balance between innovation and optimisation (cf. Veit et al. 2019, pp. 711-712). Internal collaboration can have a particularly supportive effect here. In a structural ambidexterity, collaboration between the units of exploitative learning activities, e.g. the quality management unit,

and the unit of explorative learning activities, e.g. an innovation lab, promotes their coordination and interlinking. In the context of temporal ambidexterity, exchange formats between the individual specialist departments regarding experiences with optimisation and innovation measures support the implementation of these two learning activities within the respective specialist departments.

Working hypothesis 18: Formal and informal internal collaborations between the quality management units and the innovation units strengthen the structural ambidexterity of a local authority after an aversive event.

Working hypothesis 19: Formal and informal internal exchange relationships between individual departments of a local authority with regard to optimisation and innovation measures strengthen temporal ambidexterity after an aversive event.

Capacity: Leadership methods that promote resilience

Both before and during, but also especially in the phase after an aversive event, appropriate leadership styles support the development of adaptation or transformation/innovation measures by means of reflection and learning activities and actually implement these through appropriate incentives. Collaborations can influence these capabilities from two different perspectives: Firstly, internal collaborations between leaders in a local authority can support exchange and reflection on different leadership styles and methods so that leaders can learn from the experiences of others and adapt their own leadership style accordingly. On the other hand, the leadership style itself can motivate employees to engage in internal and external collaborations with different stakeholders in the sense of "collaborative leadership" (cf. Gupta et al., 2010, p. 463). Following an aversive event, these encouraged collaborations can in turn have a positive influence on the behavioural aspects (reflection and learning activities, organisational change), capacities (ambidexterity) and properties (flexibility) that promote resilience.

Working hypothesis 20: Formal and informal internal collaborations between local authority managers will improve leadership practices following an aversive event.

Property: Flexibility

In order to be able to implement the adaptation and transformation measures developed as part of the explorative and exploitative learning activities in terms of organisational change, a local authority must be able to demonstrate a sufficient degree of flexibility. This flexibility is a necessary characteristic of a local authority's ability to adapt and transform. Informal internal and external collaborations can have a particularly supportive effect here. Informal internal collaborations across departmental and hierarchical boundaries make it possible to utilise the respective contextual knowledge of the individual employees and departments with regard to the implementation of the developed measures without formal and major time hurdles. In addition, informal collaboration allows necessary coordination processes between the stakeholders involved to be carried out more quickly, thus making the processes more flexible. Informal external collaborations can also take into account the contextual knowledge of external stakeholders in the implementation of the adaptation and transformation measures developed, thereby increasing the local authority's room for manoeuvre.

Working hypothesis 21: Informal internal and external collaborations between different hierarchical levels and departments of a local authority strengthen the flexible implementation of adaptation and transformation measures.

7 Conclusion

Divided into the dimensions "internal", "external", "formal" and "informal", the potential influence of collaboration formats to strengthen the resilience of a local authority can be summarised as follows:

Formal internal collaborations		Informal internal collaborations		
гu				
•	Sharing knowledge and information	•	Sharing knowledge and information	
	across hierarchies and departments to		across hierarchies and departments to	
	pass on knowledge about critical devel-		pass on knowledge about critical devel-	
	opments in the local authority's environ-		opments in the local authority's environ-	
	ment		ment	
•	Collaboration between the central ad-	•	Collaboration between the central ad-	
	ministration and the specialised depart-		ministration and the specialised depart-	
	ments to adapt structures and processes		ments to adapt structures and processes	
	based on identified threats		based on identified threats	
•	Low-threshold data exchange between	•	Intra-communal exchange of infor-	
	the individual departments of local au-		mation at the beginning of an aversive	
	thority		event	
•	Intra-communal exchange of infor-	•	Collaboration between local authority	
	mation at the beginning of an aversive		implementation units and other relevant	
	event		stakeholders to implement ad-hoc	
-	Event		manuras	
•	Feedback formats between decision-			
	making and implementation units of a	•	Improvised collaboration between the	
	local authority to develop meaningful		implementation units of crisis manage-	
	crisis management measures		ment measures of a local authority out-	
•	Collaboration between the crisis man-		side the usual administrative hierarchy	
	agement actors provided for in the emer-	٠	Exchange formats for the evaluation of	
	gency plans		crisis management measures	
•	Cross-hierarchical and cross-depart-	•	Exchange formats between the quality	
	mental collaboration on innovation pro-		management units and the innovation	
	jects		units of local authority	
•	Exchange formats for the evaluation of	•	Exchange formats between individual	
	crisis management measures		specialist departments of local authority	

•	Collaboration between the central ad- ministration and the specialist depart- ments of a local authority to implement learning outcomes in terms of organisa- tional change Exchange formats between the quality management units and the innovation units of local authority Exchange formats between individual specialist departments of local authority in relation to optimisation and innova- tion measures Exchange formats between local author- ity managers regarding leadership styles that promote resilience	in t • E in t t • C c t t m	n relation to optimisation and innova- ion measures Exchange formats between local author- ty managers regarding leadership styles hat promote resilience Collaboration between different hierar- chical levels and specialist departments o implement adaptation and transfor- nation measures
Fo	rmal external collaborations	Info	rmal external collaborations
•	Exchange of knowledge and information with relevant stakeholders regarding critical developments in the local author- ity's environment Exchange of best-practice examples of crisis prevention between the local au- thority and external stakeholders Inter-municipal exchange of information at the beginning of an aversive event Involving external stakeholders in the development of sensible crisis manage- ment measures Collaboration between the crisis man- agement actors provided for in the emer- gency plans Project-based collaboration with a vari- ety of partners to strengthen problem- solving capabilities Collaboration with external stakeholders on innovation projects	 E V V C C<	Exchange of knowledge and information with relevant stakeholders regarding critical developments in the local author- ty's environment Exchange of best-practice examples of crisis prevention between the local au- hority and external stakeholders inter-municipal exchange of information at the beginning of an aversive event Collaboration between local authority mplementation units and other relevant stakeholders to implement ad-hoc measures Collaboration between local authority and local stakeholders to mobilise unu- sual hybrid resources Exchange formats for the evaluation of crisis management measures Collaboration between the local author- ty and relevant external stakeholders to
•	Collaboration with external stakeholders on innovation projects Exchange formats for the evaluation of crisis management measures	• (i ¹ i ¹ n	Collaboration between the local author ty and relevant external stakeholders t mplement adaptation and transfor- nation measures

Figure 11: Tabular overview of the potential influence of collaboration formats to strengthen the resilience of a local authority (source: own illustration).

As indicated above, the 21 working hypotheses listed below were developed by means of an intensive literature review and analytical evaluation of the material analysed.

Working hypothesis 1: Formal and informal external collaborations with relevant stakeholders to share knowledge and information will support the monitoring of critical developments prior to an aversive event.

Working hypothesis 2: Formal and informal internal collaborations for knowledge and information sharing will support the identification of potential threats prior to an aversive event.

Working hypothesis 3: Formal and informal internal collaboration formats between the central administration and the specialist departments of a local authority to optimise organisational management strengthens preparation for aversive events

Working hypothesis 4: Formal and informal external collaborations between a local authority and external stakeholders to share best practice examples of crisis prevention improve a municipality's preparedness for aversive events.

Working hypothesis 5: Formal internal collaborations for low-threshold data exchange strengthen administrative staff's continuous access to information in the run-up to an aversive event.

Working hypothesis 6: Formal and informal intermunicipal collaboration formats at the beginning of an aversive event strengthen the problem acceptance of a local authority.

Working hypothesis 7: Formal and informal intra-municipal collaboration formats at the beginning of an aversive event strengthen the problem acceptance of a local authority.

Working hypothesis 8: Informal internal and external collaboration formats between executive units of a local authority and stakeholders involved in crisis management strengthen the adhoc implementation of solutions during an aversive event.

Working hypothesis 9: Formal external involvement of external stakeholders by the local authority during an aversive event strengthens the development of meaningful solutions.

Working hypothesis 10: Formal internal feedback formats between decision-making and execution units of a local authority during an aversive event strengthen the development of meaningful solutions.

Working hypothesis 11: Formal internal and external collaborations between actors included in the crisis management plans support the local authority to implement already developed plans to cope with an aversive event.

Working hypothesis 12: Informal internal collaborations between the implementation units of a local authority's crisis management measures outside the usual administrative hierarchy strengthen a local authority's capacity to improvise during an aversive event.

Working hypothesis 13: Informal external collaborations between a local authority and local stakeholders to mobilise unusual hybrid resources strengthen a local authority's ability to improvise during an aversive event.

Working hypothesis 14: Formal external project collaborations with a variety of partners will strengthen a local authorities problem-solving ability during an aversive event in the sense of a duality of plan pursuit and improvisation.

Working hypothesis 15: Formal and informal internal and external innovation collaborations strengthen the openness of a local authority with regard to different problem definitions and solution strategies during an aversive event.

Working hypothesis 16: Formal and informal internal and external collaborations for the evaluation of crisis management measures strengthen the reflection and learning phase of a local authority in the aftermath of an aversive event.

Working hypothesis 17: Formal internal collaborations between the central administration and the specialist departments of a local authority will strengthen the implementation of learning outcomes in terms of organisational change following an aversive event.

Working hypothesis 18: Formal and informal internal collaborations between the quality management units and the innovation units strengthen the structural ambidexterity of a local authority after an aversive event.

Working hypothesis 19: Formal and informal internal exchange relationships between individual departments of a local authority with regard to optimisation and innovation measures strengthen temporal ambidexterity after an aversive event.

Working hypothesis 20: Formal and informal internal collaborations between local authority leaders will improve leadership practices following an aversive event.

Working hypothesis 21: Informal internal and external collaborations between different hierarchical levels and departments of a local authority and relevant external stakeholders strengthen the flexible implementation of adaptation and transformation measures.

These hypotheses represent an attempt to answer the question of how internal and external collaborations strengthen the resilience of a local authority. As part of a research agenda, this catalogue of hypotheses can now form the basis for future empirical research with the aim of gaining further empirically based insights into the interplay between collaborations and systemic resilience, especially of local authorities.

The empirical investigation could be notably carried out in the framework of a qualitative case study. During the case study, various methods of qualitative social research could be used to collect data, with semi-structured individual interviews involving interview partners at different levels of hierarchy (managers and employees) which seem in particular promising a high level of insight. Since collaborations involve several parties working together for a specific purpose, it could also be useful to conduct several focus group discussions with groups within the local authority (for example with the heads of department or members of the municipal crisis management team) in order to derive a group opinion on the hypotheses that have been formulated and to compare these with the results of the individual interviews. The sample should consist

of several comparable local authorities in a specific geographical area. By focusing on a specific size of municipality, statements can be made about comparable units. Different sizes of municipality would be problematic under this research design, as differences in the results cannot be directly linked to the size of the objects of study. The limitations of the proposed research design lie in the limited generalisability of the research results, as these are based on a qualitative approach to a case study with a limited number of cases. In order to establish generalisability, the hypotheses adapted at the end of the investigation would have to be examined in a larger quantitative research approach.

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