

Bachelor Thesis

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An analysis of German pandemic frameworks in regard to guiding pandemic governance principles derived from an integrative scientific literature review

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Abstract

In this Bachelor thesis, findings from scientific literature on pandemic governance was integrated through an integrative literature review as research methodology. In addition, it was examined to what extent these principles can be found in two German frameworks for pandemic preparedness: First, in part 1 of the ‘national pandemic plan’ from 2017. Second, in the ‘framework for epidemic situations of national importance’ from 2019. By offering an evaluation structure, the thesis also provides thought-provoking suggestions for further research that could contribute to improving pandemic governance in Germany. In summary, it shows that many findings from the reviewed scientific literature are already covered in both practical frameworks, so that the question arises whether and why there are difficulties in implementing them.

1. Introduction

Any greater happening and action should be evaluated to acquire understanding and insights. In relation to crises, evaluation has the chance to improve responses and to design targeted preparedness and governance strategies. In Germany – legally founded in § 18 Section 1 of the Civil Defense and Disaster Relief Act (ZSKG) – the federal government (Bundesregierung) and the governments of the federal states (Landesregierungen) draft crisis scenarios on a regular basis, which serves to improve preparedness. One scenario is a major outbreak of an infectious disease. In 2012, the ‘risk analysis in civil protection 2012’ simulated a pandemic scenario caused by a hypothetical SARS virus.¹ In the following years, a new national pandemic plan (NPP) was published. Additionally, in the end of 2019, the Robert Koch-Institut (RKI) presented a conceptual epidemic framework for healthcare professionals and the public health service in Germany. In the wake of the COVID-19 pandemic, the frameworks were further amended.² Moreover, the cross-national crisis management exercise ‘LÜKEX’ practices different crisis scenarios regularly since 2004.³ In 2007, the LÜKEX dealt with a worldwide Influenza pandemic with serious consequences for the state and society.⁴ With the current COVID-19 pandemic since March 2020, pandemic preparedness takes on new importance and pandemic readiness was tested through the emergence of a real pandemic. Evaluating current pandemic governance in the wake of the COVID-19 pandemic provides an opportunity to draw critical conclusions about how to improve the infectious disease control system. Also, such an approach is legally mandated by § 5 Section 9 of the Protection against Infection Act called IfSG.⁵ With the question of how to improve pandemic governance, scientific literature on crisis management comes into focus as it can provide interesting theoretical viewpoints. For example, identifying pandemic governance principles can be one of these theoretical approaches. They help to structure crisis scenarios and can provide an orientation framework for management. In this Bachelor thesis, scientific literature on pandemic governance was reviewed for such principles. In addition, it was examined to what extent these principles can be found in two German frameworks for pandemic preparedness. Thus, this Bachelor thesis intents to offer a structuring that can be helpful for further evaluation of pandemic governance in Germany, also in the course of the COVID-19 pandemic. The relevance of conducting research on pandemic governance is high, “[s]ince Covid-19

¹ See ‘Bericht zur Risikoanalyse im Bevölkerungsschutz 2012‘

² For the national pandemic plan, the conceptual epidemic framework, and the COVID-19 related frameworks see https://www.rki.de/DE/Content/InfAZ/N/Neuartiges_Coronavirus/ZS/Pandemieplan_Strategien.html;jsessionid=4A8E8D988A8A488A8A8A8A8A8A8A8A8A

³ See https://www.bbk.bund.de/DE/Themen/Krisenmanagement/LUEKEX/luekex_node.html

⁴ See https://www.bbk.bund.de/DE/Themen/Krisenmanagement/LUEKEX/_documents/art-luekex07.html

⁵ See <https://www.bundesgesundheitsministerium.de/service/begriffe-von-a-z/s/sachverstaendigenausschuss-infektionsschutzgesetz.html>

is unlikely to be the last pandemic or disaster to engulf the world on such a massive scale” Steytler (2021, p. 10).

The research question underlying this Bachelor thesis was ‘How could Germany improve pandemic governance?’. The research question does not imply an assessment of COVID-19 governance. Rather, the thesis intents to analyze part 1 of the German ‘national pandemic plan’ (Robert Koch-Institut, 2017) and the ‘framework for epidemic situations of national importance’ (Robert Koch-Institut, 2019) in regard to pandemic governance principles derived from scientific literature. Thereby, useful insight for improving the pandemic framework might be identified. For answering the research question, three sub-questions were formulated:

1. How are pandemic governance principles based on Schulze et al. (2021) covered in other related scientific literature?
2. How are the findings regarding pandemic governance principles derived from the scientific literature review covered in part 1 of the German ‘national pandemic plan’ and the ‘framework for epidemic situations of national importance’?
3. What conclusion can be drawn from the framework review conducted for answering sub-question 2 in response to the main research question?

2. Theory

To cope with the complexity of pandemic governance and to make it more feasible to manage, the crisis might be first seen as a ‘project’ with six characteristics⁶:

- it has a temporary sequence of events,
- clear, measurable, and achievable goals can be determined
- ... for fixed periods of time,
- financial and personnel resources are limited,
- the project tasks are distinct to other organizational tasks, and
- the tasks require dedicated structures and organization.

⁶ The six project characteristics were covered in Module 7 (specialization track ‘Public Administration’), lecture 1 of Component D ‘Technological Projects’ by Dr. Christine Prokop (Assistant Professor at the Department of Public Administration (PA) within the Faculty of Behavioral, Management & Social Sciences (BMS), University of Twente.

Moreover, the pandemic scenario can be characterized by project complexity defined by Baccarini (1996), meaning that it consists of many varied interrelated parts. On the one hand, the number of elements like tasks, specialties, and components must be considered, on the other hand, the degree of interrelatedness between these elements. Complexity in projects hinders the clear identification of objectives through which the identification of certain guiding principles becomes relevant. They may provide a useful framework for managing projects. Crises can be seen as are extraordinary projects to tackle. However, the pandemic scenario addressed with this Bachelor thesis is not just characterized by complexity, it also comes with volatility as a dynamic complexity dimension, uncertainty as a risk dimension, and ambiguity as one source of uncertainty (Geraldi et al., 2011). Together, these four characteristics form the acronym VUCA, which is an abstract crisis framework and described by Bennett and Lemoine (2014). The acronym VUCA is of great concern in the context of the COVID-19 pandemic and pandemics in general. The current pandemic is indeed a crisis characterized by volatility (=V), uncertainty (=U), complexity (=C), and ambiguity (=A), making it particularly challenging to manage. The acronym “VUCA originated in post-Cold War military thinking after the collapse of the Soviet Union and was later adopted into economic science. It comprises the difficulties and challenges in describing future environmental conditions” (Schulze et al., 2021, p. 2). The COVID-19 pandemic is characterized by volatile waves of increasing and decreasing infection rates, possibly resulting in temporary hospital occupancy up to capacity limits. Then, the emergence of new virus variants increases the volatility of the crisis. With the Omicron variant, for example, earlier thresholds become meaningless due to its massive transmissibility with daily new records of infected persons. Moreover, the circumstance of high volatility goes hand in hand with the uncertainty that new variants bring. Omicron is proving to be highly infectious, but hospital occupancy is not increasing in the rates as it was experienced with the Delta variant. However, these insights are not immediately available and in the first place, crisis management must deal with the issue of lacking scientific evidence. New virus variants may also combine high transmissibility and mortality. Accordingly, governments must always weigh risk against caution and adopt strategic measures. With new insights, these measures can then be adjusted and, in turn, are criticized by others as being too harsh or not strict enough. Besides volatility and uncertainty, complexity is another applicable characteristic of the pandemic. An example that illustrates the complexity of COVID-19 crisis management is the need for priority adaption. While Omicron may be a relief in terms of hospital occupancy, the unprecedent infection rates highly endanger the functioning of critical infrastructure. In addition, the rate of virus circulation may increase the risk of new mutations, which in turn either worsen or improve the pandemic situation through their consequences. New virus variants may weaken the effectiveness of vaccines, for example.

Fundamentally, the crisis complexity is given by its far-reaching consequences and interdependencies in the areas of health, social and cultural life, economy, and politics. Finally, the COVID-19 pandemic is also characterized by the last letter of the acronym VUCA, the A for ambiguity. It describes an inability to understand cause and effect, the situation in which information is not announced clearly and aligned or data can be interpreted differently. The latter can be seen by the different strategies and measures taken by governments and the discussion about what might be appropriate and what might not. Indeed, there is no single correct approach to managing the COVID-19 crisis. A crisis management strategy can be promising at one moment but unsustainable under new pandemic conditions. For example, New Zealand pursued a very harsh Zero-COVID strategy, which was initially successfully implemented. However, with the dominance of the Delta variant with greater volatility, the strategy proved to be no longer feasible to implement (Frost, 2021).

Schulze et al. (2021) identify principles important for the successful rapid scale-up of regional SARS-CoV-2 vaccinations. This knowledge was acquired through a qualitative mixed narrative-phenomenological autoethnographic review methodology. Besides the identification of the principles, they were also linked to the four crises characteristics of the acronym VUCA. Thus, there are four crisis categories of principles: principles for mitigating volatility, uncertainty, complexity or ambiguity. Schulze et al. (2021, p. 12) assume that their method of analysis may theoretically be adjusted to any public health emergency, not just to mass vaccination campaigns. However, their derived principles as research findings also represent relevant knowledge in terms of general pandemic governance. Based on this assumption, the particular principles derived from Schulze et al. (2021) were chosen as theoretical framework for this Bachelor thesis as they may be an approach for structuring evaluation of pandemic governance in Germany. There are two reasons for the selection of the principles derived from Schulze et al. (2021) as theoretical foundation: First, their crisis management principles are oriented to the acronym VUCA. This means that the respective principles give the pandemic scenario a comprehensible structure, making it more feasible to manage. The principles provide guidance for managing specific characteristics of a pandemic, such as the issue of high volatility. The fragmentation into the four VUCA dimensions can bring more clarity to confusing crisis events. Second, the principles by Schulze et al. (2021) explicitly arise in the context of the COVID-19 pandemic in Germany. Thus, they derive from practical experience and are therefore more tangible compared to other existing scientific publications. In Table 1, the principles identified by Schulze et al. (2021) were listed, but compiled into a generalizable framework:

Table 1: pandemic governance principles

Mitigating volatility	<ul style="list-style-type: none"> • Implement and communicate a shared vision and key priorities • Adapt operations and strategies if necessary, however, linked to the centrally defined and persistent priorities and key directives • Do an informed planning of supply capacities, understand the critical elements, plan with capacity volatility, develop strategies for handling under- and oversupply • Motivate stakeholders to maintain their resilience and commitment also under constantly changing conditions
Mitigating uncertainty	<ul style="list-style-type: none"> • Do an informed planning of supply capacities <i>(also mentioned for mitigating volatility)</i> • Provide accuracy of information, communicate clearly and aligned • Divide roles and responsibilities, use networks, and build trust • Create vocal points and define go-to persons with comprehensive overview and where fragmented information is concentrated • Manage a balanced information sharing (meaning that certain stakeholders get information they need but do not receive information which is irrelevant for their role) • Promote understanding of the crisis, promote professional understanding of stakeholders' tasks, provide sufficient information about strategies, rules, procedures, and use Standard Operation Protocols • Build on expertise • Use synergies, share best practices, establish exchange platforms for strategic, scientific, and professional questions • Engage expert groups and smaller focus teams to develop solutions and to achieve alignment in handling important issues
Mitigating complexity	<ul style="list-style-type: none"> • Engage interdisciplinary task forces <i>(not only 'smaller focus teams' as mentioned in the context of mitigating uncertainty, but interdisciplinary focus teams covering certain tasks)</i>

	<ul style="list-style-type: none"> • Use established structures and networks, especially have constant partners and fixed coordinators in key sections <i>(also linked to the uncertainty principles of divided responsibilities, vocal points, the use of networks, and Standard Operation Protocols)</i> • Cross-team transparency and cross-boundary alliance building between institutions <i>(links to the uncertainty principles of building trust and managing a balanced information sharing)</i> • Establish a regular information exchange with similar task forces from other regions <i>(links to the uncertainty principles of using synergies, sharing best practices, and establishing exchange platforms for strategic, scientific, and professional questions)</i> • Frequently reminders on key goals and the mutual benefit of cooperation
Mitigating ambiguity	<ul style="list-style-type: none"> • Strong government mandates, responsibilities, and competences • Early announcement of plans and intentions • Medium-term announcements for allowing proactive analysis and planning

3. Methods & Data

The response to the research question was grounded in an integrative literature review as research methodology. This methodology was based on Snyder (2019) and Torraco (2005). Since the production of knowledge grows at high speed and at the same time often remains fragmented (Snyder, 2019, p. 333), an literature review tries to bundle related findings. Snyder (2019) defines a literature review as a “more or less systematic way of collecting and synthesizing previous research” (*ibid.* p. 333). Because there exist different approaches of reviewing literature, one approach had to be chosen. This Bachelor thesis used an integrative literature review methodology, as mentioned, since it did not intent “to cover all articles ever published on the topic but rather to combine perspectives and insights (...)” (*ibid.* p. 336; and see p. 334). Regarding the method of data collection, a search strategy for identifying relevant literature was developed as it was proposed by Snyder (2019, p. 337). “This includes selecting search terms and appropriate databases and deciding on inclusion and exclusion criteria” (*ibid.* p. 337):

- **Examples for used search terms:** pandemic governance germany; pandemic governance principles germany; risk governance covid 19; transboundary crisis; covid 19 vuca; nationaler pandemieplan deutschland; rahmenkonzept pandemie rki; lükex 07; risikoanalyse 2012; crisis management germany.
- **Databases:** mostly free internet search. Moreover, the websites of the Robert Koch-Institute (RKI)⁷, German Federal Ministry of Health (BMG)⁸, Federal Ministry of the Interior (BMI)⁹, Federal Office of Civil Protection and Disaster Assistance (BBK)¹⁰ were consulted. Furthermore, the online library services from the University of Twente¹¹ and Westfälische Wilhelms-Universität Münster¹² were used, as well as Google Scholar. Besides, also references and bibliographies of consulted literature was reviewed for finding relevant literature.
- **Inclusion criteria:** case study of Germany; relation to pandemic governance; relation to the COVID-19 pandemic; relation to crisis management; relation to the acronym VUCA.
- **Exclusion criteria:** case studies of countries others than Germany; insufficient relation to pandemic governance; insufficient relation to crisis management principles or crisis evaluation.

After reviewing a pool of literature, a selection was made because the scope of the literature review had to be limited for this Bachelor thesis. First, scientific literature was selected. The aim was not to verify the principles derived from Schulze et al. (2021), but to integrate findings. The research methodology of an integrative literature review was chosen since it became apparent that literature on crisis management and pandemic governance shares important commonalities with respect to the principles derived from Schulze et al. (2021). The following scientific literature was selected:

- Boin, A. (2019). The Transboundary Crisis: Why we are unprepared and the road ahead. *Journal of Contingencies and Crisis Management*, 27(1), 94–99. <https://doi.org/10.1111/1468-5973.12241>
- Collins, A., Florin, M.-V., & Renn, O. (2020). COVID-19 risk governance: drivers, responses and lessons to be learned. *Journal of Risk Research*, 23(7-8), 1073–1082. <https://doi.org/10.1080/13669877.2020.1760332>

⁷ See https://www.rki.de/DE/Home/homepage_node.html

⁸ See <https://www.bundesgesundheitsministerium.de/index.html>

⁹ See <https://www.bmi.bund.de/DE/startseite/startseite-node.html>

¹⁰ See https://www.bbk.bund.de/DE/Home/home_node.html

¹¹ See <https://ut.on.worldcat.org/discovery>

¹² See <https://disco.uni-muenster.de/?plv=2>

- Franzke, J. (2020). Deutschlands Krisenmanagement in der CORONA-Pandemie. Herausforderungen eines föderalen politisch-administrativen Systems. *Rocznik Integracji Europejskiej*(14), 325– 342. <https://doi.org/10.14746/rie.2020.14.21>
- Kuhlmann, S. (2020). Between Unity and Variety: Germany's Responses to the COVID-19 Pandemic. In P. Joyce, F. Maron, & P. S. Reddy (Eds.), *Good Public Governance in a Global Pandemic*. The International Institute of Administrative Sciences.
- Leonard, H., Howitt, A., & Giles, D. (2020). Crisis Management for Leaders Coping with COVID-19. *Program on Crisis Leadership, John F. Kennedy School of Government, Harvard University*.
- Moorkamp, M., Torevlied, R., & Kramer, E.-H. (2020). Organizational synthesis in transboundary crises: Three principles for managing centralization and coordination in the corona virus crisis response. *Journal of Contingencies and Crisis Management*, 28(2), 169–172. <https://doi.org/10.1111/1468-5973.12294>

On the other hand, as pandemic policy and strategy paper, part 1 of the German ‘national pandemic plan’ and the ‘framework for epidemic situations of national importance’ were selected. The approach is to explore whether the identified principles from the integrative literature review are already addressed in the practical frameworks or whether there is potential room for improvement. The framework for epidemic situations of national importance “describes the existing structures and processes, makes recommendations on how to proceed in such situations, and identifies concrete needs for further advancement in numerous areas of action. It forms a bridge between the abstract concepts of general civil protection and disaster management and the partly very specific scenario-oriented plans of infection control, such as the influenza pandemic plan or the Ebola fever framework” (RKI, 2019, Vorwort). Additionally, the framework was published in late 2019, just before the COVID-19 pandemic outbreak, making it very timely in terms of German pandemic preparedness planning. Part 1 of the German national pandemic plan was selected for the review because it can as well be considered as a core document for pandemic governance planning.

“The data analysis part of a integrative (...) review is not particularly developed according to a specific standard” (Snyder, 2019, p. 336). The textual analysis of this Bachelor thesis was mainly supported through coding in the software ‘Atlas.ti’. As introduced in the theory section, the theoretical framework of this Bachelor thesis are the pandemic governance principles compiled in Table 1, based on Schulze et al. (2021). The further scientific literature was coded using the text analysis software 'Atlas.ti', where the pandemic governance principle listed in Table 1 represented codes for analysis. Hence, the selected scientific literature was searched for indications of similarities to the specific pandemic governance principles based on Schulze et al. (2021) for answering sub-question 1 of this thesis. Corresponding text passages were coded accordingly. The result is presented in the following analysis section.

4. Analysis

4.1 Scientific literature review

Throughout the review of the scientific literature, it became apparent that founded indications of similarities to the specific pandemic governance principles were not always separable in the way they were derived from the article by Schulze et al. (2021). This was the reason that certain principles have been merged into one code:

- P4 ‘Do an informed planning of supply capacities, understand the critical elements, plan with capacity volatility, develop strategies for handling under- and oversupply’ was only coded once even if the principle was mentioned twice, as principle for mitigating volatility and mitigating uncertainty.
- P6 and P7 have been merged in the way that ‘build trust’ from P7 was added to P6 ‘Cross-team transparency and cross-boundary alliance building between institutions’. This reformulation appeared necessary because ‘build trust’ seemed to fit better in the context of P6, thus leaving P7 ‘Divide roles and responsibilities, use networks’ as a clearer principle.
- With P12, the principle ‘Create vocal points and define go-to persons with comprehensive overview and where fragmented information is concentrated’ has been merged with the principle ‘Use established structures and networks, especially have constant partners and fixed coordinators in key sections’ as they both emphasize the creation of vocal points and fixed coordinators in key sections.
- With P13, the principle ‘Use synergies, share best practices, establish exchange platforms for strategic, scientific, and professional questions’ has been merged with the principle ‘Establish a regular information exchange with similar task forces from other regions’ as they both emphasize the importance of information exchange between different actors.

Table 2: coding scheme (Atlas.ti)

Abbreviation	VUCA dimension	Pandemic governance principle (code)	Frequency
P1	Volatility	Implement and communicate a shared vision and key priorities	23
P2	Volatility	Adapt operations and strategies if necessary, however, linked to the centrally defined and persistent priorities and key directives	21

P3	Uncertainty	Provide accuracy of information, communicate clearly and aligned	18
P4	Volatility	Do an informed planning of supply capacities, understand the critical elements, plan with capacity volatility, develop strategies for handling under- and oversupply	17
	Uncertainty	Promote understanding of the crisis, promote professional understanding of stakeholders' tasks, provide sufficient information about strategies, rules, procedures, and use Standard Operation Protocols	14
P6	Complexity	Cross-team transparency and cross-boundary alliance building between institutions <i>(links to the uncertainty principles of building trust and managing a balanced information sharing)</i> Build trust (merged from P7)	12
	Uncertainty		
P7	Uncertainty	Divide roles and responsibilities, use networks ('build trust' has been merged with P6)	11
P8	Uncertainty	Engage expert groups and smaller focus teams to develop solutions and to achieve alignment in handling important issues	11
P9	Uncertainty	Build on expertise	10
P10	Ambiguity	Strong government mandates, responsibilities, and competences	10
P11	Complexity	Engage interdisciplinary task forces <i>(not only 'smaller focus teams' as mentioned in the context of mitigating uncertainty, but interdisciplinary focus teams covering certain tasks)</i>	8

P12	Uncertainty Complexity	Create vocal points and define go-to persons with comprehensive overview and where fragmented information is concentrated Use established structures and networks, especially have constant partners and fixed coordinators in key sections <i>(also linked to the uncertainty principles of divided responsibilities, vocal points, the use of networks, and Standard Operation Protocols)</i>	6
P13	Uncertainty Complexity	Use synergies, share best practices, establish exchange platforms for strategic, scientific, and professional questions Establish a regular information exchange with similar task forces from other regions <i>(links to the uncertainty principles of using synergies, sharing best practices, and establishing exchange platforms for strategic, scientific, and professional questions)</i>	6
P14	Ambiguity	Medium-term announcements for allowing proactive analysis and planning	4
P15	Volatility	Motivate stakeholders to maintain their resilience and commitment also under constantly changing conditions	4
P16	Uncertainty	Manage a balanced information sharing (meaning that certain stakeholders get information they need but do not receive information which is irrelevant for their role)	3
P17	Ambiguity	Early announcement of plans and intentions	3
P18	Complexity	Frequently reminders on key goals and the mutual benefit of cooperation	2

Throughout the writing of the integrative literature review, it became clear that a very exact separation according to the coding scheme was no longer possible since several points blurred with others. Even if points from the reviewed literature obviously matched principles based on Schulze et al. (2021), they did not always fit the exact categorization. This is also the summarized response to sub-question 1 ‘How are the pandemic governance principles based on Schulze et al. (2021) covered in other related scientific literature?’. Thus, central points from the scientific literature were integrated into the following structure:

- 4.1.1 Vision & key priorities
- 4.1.2 Operations & strategies
- 4.1.3 Information & communication
- 4.1.4 Critical elements
- 4.1.5 Roles & responsibilities
- 4.1.6 Expert groups
- 4.1.7 Government mandates
- 4.1.8 Vocal points

Annotations were made to link certain findings from the scientific literature to the coding scheme. In addition, to provide a better overview, key words that can be identified as key findings from the literature review were highlighted in the text.

4.1.1 Vision & key priorities

Schulze et al. (2021, pp. 8–9) name the importance of a **shared vision** (P1) by stakeholders. In the context of the regional emergency rollout of SARS-CoV-2 vaccinations, the shared vision was the “fast vaccination of the population (...) to overcome the pandemic” (*ibid.* p. 8). “If partners are convinced of the same goal, information exchange becomes much easier and hence can be done at lower transaction cost” (*ibid.* p. 8). This means that a shared vision (P1) sets a clear goal for the actions of the stakeholders that everyone strives to achieve.

Moorkamp et al. (2020, p. 170) identify the principle of formulating key priorities (P1) and their reformulation over time, which connects to the shared vision introduced by Schulze et al. (2021). In the pandemic context, alternating between medical, economic, and social priorities, for example (*ibid.* p. 170). If confronted with a pandemic as whole, several desired but conflicting goals exist: On the one hand, containing the infectious outbreak to protect citizens from potentially severe medical implications.

On the other hand, minimizing economic outages, financial losses, or the goal of enabling social life as far as possible. Hence, the goals must be balanced by **formulating and reformulating key priorities**. In phases of decreasing infections (volatility dimension), the priority may shift from strict containment measures to lighter measures allowing the economy to run and social life to flourish. Also, measures may be adopted to changing characteristics of a virus, new knowledge, or technology (uncertainty). Leonard et al. (2020, p. 6) introduces the principle of a shared vision (P1) in another sense, compared to Schulze et al. (2021) and Moorkamp et al. (2020). They emphasize the benefits of implementing a mindset “of joint inquiry rather than engaging in an internal battle of advocacy” (*ibid.* p. 6). They elaborate on this by saying: “Advocacy behavior includes: arguing for your point of view and against the views of others; hiding the weaknesses of your suggestions (which you probably know better than others); pointing out the weaknesses of the suggestions made by others. By contrast, inquiry behavior involves: building on the suggestions of others; seeking synthesis and integration that combines ideas into a better suggestion; revealing weaknesses of your suggestion in the hope that others might see a way to ameliorate them; generally, behaving as if ‘we all win if we get the best possible answer’ rather than ‘I win if the answer we choose is the one I presented.’” (Leonard et al., 2020, p. 6). This **shared vision of joint inquiry** also relates to the principle of cross-boundary alliance building and building trust (P6).

Boin (2019, p. 95) introduces the concept of ‘transboundary crises’, which resemble the concept of a ‘VUCA crisis’: Transboundary crises are characterized by multiple dimensions, meaning a **diversity in possible perspectives on a crisis**: “[W]hat in one country is considered a local matter is Chefsache in another country” (*ibid.* p. 96) is one example he gives. Thereby, Boin (2019) relates to the principle of a shared vision (P1) but linked to the VUCA concept’s ambiguity dimension:

- In one country, pandemic governance may be mainly organized on federal state level and most stakeholders share the vision that this leads to the most appropriate actions since measures are adopted to regional situations. Intrastate differences are not seen as disorganization, but as intentional.
- In another country, pandemic governance may be organized highly centralized. This may result from a country’s centralized political system or because most stakeholders see centralized actions as being most appropriate and decentralized actions as confusing.

Like Boin (2019), Collins et al. (2020, p. 1076) point to the existence of different perspectives on a crisis and thus its ambiguity. However, referring to the **ambiguity in possible strategies**: “China appears to have evaluated the risk of the disease [COVID-19] spreading as being closer to intolerable, taking

comprehensive and intrusive steps to suppress the Wuhan outbreak and prevent it from spreading to the rest of the country. At the other end of the spectrum, a small number of countries appear at times to have been willing to accept a much greater degree of COVID-19 risk, foregoing widely implemented suppression measures in order to allow the infection to spread, seemingly in the hope that herd immunity could be achieved (*ibid.* p. 1076). As a key priority (P1), Collins et al. (2020, p. 1079) propose **focusing on key nodes in the system**: “Sharply restricting air travel as early as possible is an important way of slowing or halting the spread of an outbreak. To facilitate this kind of rapid disruption, a global emergency fund could be established to provide immediate compensation to affected parties, such as airlines and airport operators” (*ibid.* p. 1079). As a shared vision (P1), Collins et al. (2020, p. 1079) advise **effective integration of science into policymaking**. In this regard, it would be advantageous for every country to “review the effectiveness of its current model of science-policy integration in light of COVID-19 experiences (...)” (*ibid.* p. 1079). Another suggestion related to the principle of a shared vision (P1) is to **reflect on positive and negative changes resulting from crises** (*ibid.* p. 1079). This may include, for example, a reflection on the greater use of digital technologies, rethinking crisis preparedness, or reflecting on societal tensions.

4.1.2 Operations & strategies

Moorkamp et al. (2020, p. 170) identify the necessity for allowing **flexible adaption of crisis management protocols** (P2). On the one hand, they refer to the danger of top-down and locally ill-fitting crisis response strategies (*ibid.* p. 170). The regional volatility of infections is likely to differ so that an adaption of local measures may be appropriate. On the other hand, Moorkamp et al. (2020, p. 170) refer to the need for centralized overview and control. They propose to create centralized coordination platforms for the dispersion of patients from overburdened hospitals to less affected areas in the context of the COVID-19 pandemic, for example (*ibid.* p. 170). This ties into the volatility and uncertainty dimension of the VUCA concept by taking up the principle of creating vocal points for having comprehensive overview (P12).

Boin (2019) argues that **traditional crisis management must be adapted to new transboundary crises scenarios**. Conventional solutions may be defied by transboundary crises, which also tend to be more ambiguous regarding possible strategies (*ibid.* p. 95). This relates to the principle of adapting operations and strategies (P2), however, more in the sense of assessing transboundary crisis scenarios and designing dedicated courses of action. It implies a revision of contingency plans. As one transboundary crisis scenario, Boin (2019, p. 94) names the SARS pandemic in 2002. All named examples for transboundary crisis scenarios have in common that they “had origins in faraway domains”

(ibid. p. 94). In this regard, it can be put forward that the globalization does not only intermingle economies and societal life, but also political systems. The functioning or non-functioning of one country's infectious disease control can have severe consequences even on faraway countries. This circumstance emphasizes the **increasing relevance of intergovernmental and supranational approaches** since “(...) the Transboundary Crisis challenges borders” (Boin, 2019, p. 95).

As Boin (2019), also Leonard et al. (2020, p. 1) contrast crises like the current COVID-19 pandemic with more familiar ‘routine emergencies’. They emphasize the far-reaching effects of a pandemic as it is not only a medical phenomenon and challenge, but can also be a “potentially traumatizing event, a highly disruptive economic event, and a complex logistical event, among many other dimensions” (Leonard et al., 2020, p. 1) [complexity of dimensions]. They conclude that crisis scenarios like pandemics confront governments with a highly uncertain situations in which the success of measures is uncertain and ambiguous (ibid. p. 3). “Effective leadership in a true crisis situation can thus be characterized by **rapid innovation** (...)” (Leonard et al., 2020, p. 3). In this regard, Leonard et al. (2020, p. 3) emphasize the importance of **acting in accordance with appropriate guiding processes**, which can be related to the principles of using standard operation protocols (P5) and adapting operations (P2). A guiding problem-solving and learning cycle is presented, which has to be considered as a steady and looping process:

<u>Problem-solving step</u>	<u>Associated form of intellectual action</u>
(0) Establish goals, priorities, and values	Moral reasoning
(1) Understand the key elements of the situation	Description
(2) Develop options	Creative thinking
(3) Predict outcomes from each option	Analytical reasoning
(4) Choose the best option based on (3) and (0))	Executive decision-making
(5) Execute	Administrative tasking

Connecting to the guiding cycle presented by Leonard et al. (2020), also Kuhlmann (2020, p. 303) advises that early **feedback mechanisms for adjusting potentially disproportionate mitigation strategies** must be implemented to assess measures' primary and unintended secondary effects (ibid. p.

303). Such mechanisms can be linked to the principle of using standard operation protocols (P5) and adapting operations and strategies (P2).

In addition to Leonard et al. (2020) and Kuhlmann (2020), Schulze et al. (2021, p. 12) underline the use of standardized procedures that adapt over time to lessons learned, too.

4.1.3 Information & communication

Schulze et al. (2021, p. 9) describe that in the context of the mass vaccination campaign in Heidelberg, “[o]ne of the largest uncertainty factors was the **accuracy of information** (...).” There was uncertainty about the “(...) handling of the newly introduced mRNA-vaccine products” (Schulze et al., 2021, p. 9) and about the availability of vaccination products, in general. Therefore, the operators need to receive necessary information quickly and through easy means of communication (*ibid.* p. 12). This described principle of providing accuracy of information to stakeholders (P3) intermingles with the principle of promoting stakeholders’ understanding of tasks and providing sufficient information about strategies, rules, and procedures (P5). Furthermore, a lack of **frequently communicating the vision and priorities** (P1 and P18) “(...) may lead individual team members to get lost in the detail, feel overwhelmed, and become disoriented” (*ibid.* p. 8). This includes **reminding stakeholders to cooperate for the mutual benefit**, linking to (P18) (*ibid.* p. 8).

Leonard et al. (2020, p. 4) give advice regarding how to communicate in extraordinary crises: “In a culture in which expectations were formed in the routine environment, and where leaders are thus expected to be prompt and decisive answer-givers, this pressure is difficult to resist. Leaders should answer such expectations by saying something along these lines: ‘We are in unprecedented circumstances here, so we won’t immediately know the best answer to this – instead, we have confidence that we have the right people working on this, and they will develop the best possible current answer in the circumstances ... and we will revisit and update that as we go forward and learn more and as the situation changes.’” (*ibid.* p. 4). Thus, **decided actions must be communicated and executed, but also treated as preliminary and exploratory**. However, **best efforts are taken to learn as quickly as possible** (*ibid.* p. 7). For that reason, guidance through a problem-solving and learning cycle presented by Leonard et al. (2020) may be useful.

Collins et al. (2020, p. 1077) emphasize that “**transparent communication of reliable scientific data** among scientists is central to reducing uncertainty and facilitating robust risk assessments” (*ibid.* p. 1077). Furthermore, it is brought forward that “**effective communication between scientists and policymakers** is key to the formulation (and modification where necessary) of evidence-based management strategies. And **clear channels for communication between policymakers and the**

public are needed in order to ensure the legitimacy and durability of management strategies (...)" (ibid. p. 1077). Collins et al. (2020) refer guiding principles presented by Renn (2010) for communicating about risk. Also, Collins et al. (2020, p. 1077) emphasize the **importance of communicating consistent messages** and to **keep in mind the existence of different audiences**. This relates to the principle of communicating clearly and aligned (P3). Moreover, it is emphasized that “[u]ncertainties must be communicated because silence about them can undermine credibility. However, incautious communication of uncertainties can lead to fear and exaggerated negative risk perceptions. For this reason, the imperatives are to **(i) communicate uncertainties as precisely as possible, and (ii) make clear what steps are being taken to reduce the degree of uncertainty**” (ibid. p. 1080). This connects to the communication advices by Leonard et al. (2020) as described above, that decided actions must be communicated and executed, but also treated as preliminary and exploratory (ibid. p. 7). As source for information on how to communicate uncertainty in the context of clinical evidence, Collins et al. (2020, p. 1077) refer to Han (2013).

4.1.4 Critical elements

In crisis situations, stakeholders need to **understand the critical elements** (P4). Strategies must be developed for dealing with capacity volatility, for example, by creating reserves of resource or establishing procedures for relocating personnel (P4). In the context of SARS-CoV-2 vaccinations, the critical elements are the availability of vaccines (Schulze et al., 2021, p. 8) and the population’s willingness to accept vaccination offers. Regarding resource buffers, a strategy must be followed. The second SARS-CoV-2 vaccine dose was initially kept stored, for example (ibid. p. 9). Later, when vaccine product availability increased, the strategy changed. Then, second doses were “(...) being released, allowing a higher initial vaccination rate in the population assuming, despite the risk, that more product would be received and be available for a second dose within the required time period” (ibid. p. 9). This strategy of handling the critical element (P4) also links to the principle of adapting operations and strategies (P2).

Collins et al. (2020, p. 1074) argue that shortages in the health sector have been exacerbated by efforts to increase short-term operational and financial efficiency, at the expense of investments that would have strengthened the sector’s long-term resilience. This demonstrates the interplay between pursued priorities (P1) and their potential impact on critical elements (P4). Because pandemics are scenarios that occur infrequently, identifying and actively acting on potentially critical elements may become a lower priority. In this regard, Collins et al. (2020, p. 1078) also highlight the risk if critical resources are

produced with a high dependence on foreign countries as it was experienced with protective clothing and face masks in the course of the COVID-19 pandemic.

Leonard et al. (2020) remark as well that in crisis, “(...) required resources may go beyond what is normally available (...)” (*ibid.* p. 3).

4.1.5 Roles & responsibilities

Franzke (2020, p. 326) does not give advice in the manner of formulating a pandemic governance principle. However, he gives crucial information regarding the principles of divided roles and responsibilities (P7) and cross-boundary alliance building (P6) in terms of pandemic governance in Germany. Franzke (2020) highlights the Unitarianism of Germany’s federal system, meaning that the 16 federal states have a strong position and autonomy with regard to their own government, legislation, administration and judiciary. In this regard, Art. 70 ff. of the German Basic Law (GG) regulates the legislative competences of the federal level and the federal states. It is distinguished between exclusive and concurrent legislation competences. Art. 71, 73 GG describe areas of exclusive legislation competences of the federal level, Art. 72, 74 GG areas of concurrent legislation competences. The area of infectious disease control is part of the concurrent legislation competence (Art. 74 Section 19) and grants the federal states legislative competence as long as the federal level does not exercise its legislative competence. In this context, Franzke (2020, p. 326) emphasizes the relevance of the ‘cooperative federalism’ in Germany since the federal government needs the administrative support by the federal states to implement infectious disease control measures. Therefore, important decisions are discussed and decided jointly between the federal and state governments. For example, by meetings between the Federal Chancellor and the heads of the federal state governments (*ibid.* p. 326). Nevertheless, there may be regional differences in the implementation, for which the respective federal state governments are politically responsible. Reasons for regional differences may be result different infection patterns or different policy approaches to combating a pandemic (*ibid.* p. 327).

In addition to Franzke (2020), the Scientific Service of the German Bundestag elaborated on the principle of a strong government mandate, clear responsibilities, and competences (P10). The federal legislature has the competence to specify which concrete measures must be taken if a certain incidence level, for example, is exceeded in an area such as a county (Wissenschaftlicher Dienst des Deutschen Bundestag, 2021, p. 5). The federal legislature may withdraw the power to issue ordinances from the state governments pursuant to § 32 IfSG. According to Art. 83 GG, the execution of federal legal provisions would be the exclusive responsibility of the federal states. However, in the case of a detailed regulation of the measures to be taken, the federal states would have little room for their own

interpretation of the law (*ibid.* p. 5). Thus, the federal level is mandated with a strong role, if necessary (P10).

Furthermore, Boin (2019, p. 94) identifies that not just one but many stakeholders are confronted with managing ‘transboundary crises’ [complexity of managing] (*ibid.* p. 94). **Strategies for the division of roles and responsibilities must be determined, planned operation procedures eventually extended** (*ibid.* p. 94). This links to the principle of dividing roles and responsibilities (P7) and adapting operations if necessary (P2). Boin (2019, p. 94) emphasizes that also and maybe especially in times of crisis, “the public expects representatives of the State to take charge” (*ibid.* p. 94), which links to the principle of a strong government mandate (P10). He stresses that failure, of course, but also the lack of **clear responsibilities** potentially undermine the legitimacy of public authorities (*ibid.* p. 94). The discovery of insufficient political-administrative arrangements for a transboundary crisis may **shed light on structural governance deficits** (*ibid.* p. 95), so that structural reforms become obvious. Furthermore, regarding the principle of dividing roles and responsibilities (P7), Boin (2019) highlights the difficulty that “[t]he Transboundary Crisis does not fall neatly into a defined domain, with a clear division of tasks and responsibilities. The Transboundary Crisis challenges multiple actors with various responsibilities. It is not clear which actor is responsible for what or who has the capacities to perform certain tasks. The Transboundary Crisis blurs the organizational boundaries that normally facilitate an effective response” (*ibid.* p. 95). Therefore, a flexible division of tasks and cross-boundary understanding through dedicated liaison workers may be necessary. Boin (2019, p. 95) introduces two types of mechanisms regarding setting responsibilities:

- First, ‘coordination mechanisms’ which may solve complex problems of traditional crises. However, Boin (2019, p. 95) argues that they are not as suitable in transboundary crises because of uncertainty about critical actors and their authority and because “it is hard to establish or negotiate ownership in a short time frame” (*ibid.* p. 95). Accordingly, this emphasizes the importance of having already established structures and networks, especially with constant partners and fixed coordinators in key sections (P12). Complexity und uncertainty in managing can thus be mitigated.
- Second, ‘centralizing emergency powers’ in the hands of a leader or central body as the traditional catch-all solution (*ibid.* p. 95). However, Boin (2019, p. 95) argues that crisis centralization comes with constraints in modern democracies. “Moreover, the ‘high command’ is not always defined clearly enough, and the mechanisms that should regulate such a concentration of power are cumbersome” (*ibid.* p. 95). In this context, Boin (2019, p. 95) also

states the existing tension between legal consideration and the required speed of action. He argues that "[t]his tension can often only be circumvented in an environment in which political actors know and trust each other" (ibid. p. 95). Thus, it is said that the principle of a strong government mandate (P10) comes with difficulties in democracies. Accordingly, achieving cross-team transparency, building cross-border alliances and trust (P6) becomes even more a priority for crisis management.

Furthermore, Boin (2019) brings forward that “[in] a Transboundary Crisis, the nation state may not be the only actor” (ibid. p. 95). Here, he points to EU agencies, “which in principle could play a decisive role during a transboundary crisis” (ibid. p. 95). However, Boin (2019, p. 95) criticizes their ineffectiveness due to the absence of decision-making powers. This circumstance emphasizes again the potential of intergovernmental and supranational approaches.

4.1.6 Expert groups

The **use of synergies is beneficial** (P13), which includes sharing best practices and establishing exchange platforms regarding strategic and scientific questions (Schulze et al., 2021, p. 8-9). **Expert groups or smaller focus teams provide a solution for achieving alignment in handling important issues** (ibid. p. 9), which helps mitigating uncertainty (P8). Regarding complexity, Schulze et al. (2021, pp. 5–8) identify **interdisciplinary task forces** (P11) as one solution.

Moorkamp et al. (2020, p. 170) identify the principle of establishing **multipurpose units**, too (P11): “The moment we have entered the ‘warm phase’ of the virus outbreak, we may be in the ‘hot phase’ of the socio-economic crisis (...) (ibid. p. 170).

Leonard et al. (2020, p. 4) identify **three types of task forces needed** for understanding and deliberating about a crisis (P8): first, a task force elaborating on “key priorities, equities, values, and goals of the organization” (ibid. p. 4). Second, a task force that gathers knowledge about the crisis event and develops “forward-looking perspectives on how it is likely to evolve” (ibid. p. 4). Third, a task force that has “intimate knowledge about the organization” (ibid. p. 4). Moreover, Leonard et al. (2020, p. 6) propose to consider the activation of “a **secondary ‘Special Advisory Group’** that is not actively involved in overseeing or managing the response, to serve as a sounding board and creative resource” (ibid. p. 6) following the example by the ‘Team B’ of the Centers for Disease Control (CDC) in the USA. “A major point (and design feature) of such a group of advisors is that the people who are involved directly in responding to the event may not have time or the ability to get a bigger-picture view of the event, so the advisory group may be able to maintain perspective and provide help to the operational group by spotting

additional issues, seeing ideas elsewhere that could be applied locally, and generally adding to the creative bandwidth” (Leonard et al., 2020, p. 6). As a failure factor, Leonard et al. (2020, p. 1) identify lacking integration of **interdisciplinary understanding of a crisis scenario**: The problem with ‘non-routine emergencies’ is the fact that best practices are not readily available, so that uncertainties and ambiguities exist. To maximize the prospects of better decision-making, Leonard et al. (2020, p. 5) emphasize the employment of **diverse task forces** (P11). Moreover, they propose **relatively flat hierarchies in the sense that “people don’t have rank – ideas have rank”** (*ibid.* p. 6). They highlight this maxim as important, since “deliberations often converge prematurely to what the ‘boss’ seems to want” and that people “often feel comfortable delegating the process upward instead of presenting their dissenting view; often, in a stressful setting, dissent can be misinterpreted and/or implicitly discouraged at precisely the time when it may be most valuable” (*ibid.* p. 6).

4.1.7 Government mandates

Ambiguities were identified by Schulze et al. (2021, p. 4) in various fields. During the regional emergency rollout of SARS-CoV-2 vaccinations in Heidelberg, “[t]here was high pressure for action, while resource availability, in particular personnel and equipment, did not match the ambitious goals. Some initial stretch goals were challenging because there was no follow-up plan yet. Some unaligned public announcements could therefore not be translated into tangible action. There was cognitive dissonance about vaccination among the public. Eligible vaccination candidates refused to be vaccinated, whereas others not yet eligible felt left behind (...)" (*ibid.* p. 4). They describe that “[i]t proved to be very helpful that the **intended mission was announced very early by the Federal government (...)**" (*ibid.* p. 4), so the principle of early announcing plans and intentions is stressed (P17). Ambiguities increase by short-term announcements and lacking future perspectives. In addition, they hinder proactive analysis and planning, linking to the principle of medium-term announcements by the government (P14).

Boin (2019, p. 97) argues “[w]hen a crisis involves multiple actors, each with their own responsibilities, interests and working methods, **it must be clear who is authorized to decide what**. This emphasizes the principle of a strong government mandate (P10). He also puts the principle of a strong government mandate into the legitimacy dimension by arguing that “(...) it is **crucial that the ‘crisis owner’ can rely on political and public support**. If this is not the case, the legitimacy of public institutions may come under pressure. Without a solid legitimacy basis, effective crisis management becomes difficult” (*ibid.* p. 98). This in turn intermingles with the principle of cross-boundary alliance building and trust

(P6). Boin (2019, p. 98) argues that **strong coordination between different actors requires trust- and alliance-building even before a crisis**. Moreover, he believes that “[p]romising initiatives can be found at the interface of public and private” (ibid. p. 98), so that complex issues can be tackled by expertise (P9), strong networks (P12), and the use of synergies (P13).

4.1.8 Vocal points

Regarding Schulze et al. (2021, p. 9), a key uncertainty factor identified is the lack of complete situational and directive overview. Therefore, **roles and responsibilities must be defined and established**. Fragmented information must be, in turn, brought together as much as possible to **create a vocal point** (P12). “[U]ncertainty about the appropriate amount and frequency for information sharing (...)” (ibid. p. 9) must be managed, to find a **balance between a lack of sharing important messages on the one hand and an unnecessary flood of information on the other** (P16). Therefore, a coordinating instance is necessary.

Boin (2019, p. 97) emphasizes the importance of creating vocal points (P12) “to quickly collect information from a variety of organizational domains” (ibid. p. 97). **Critical information must be identified, and its sources located**. Moreover, the **vocal point “must also learn to make sense of that information**, which is likely to be difficult as the information emanates from very different sources” (ibid. p. 97). This connects to the mitigating uncertainty principle of promoting understanding of the crisis, promoting professional understanding, and the provision of sufficient information (P5).

Furthermore, Leonard et al. (2020) identify the need for establishing “an **over-arching team that is responsible for overseeing the event as a whole** (...)” (ibid. p. 4). Otherwise, it is easy to lose track of who is taking on which tasks or which responsibilities still need to be assigned (ibid. p. 4). Thus, a vocal point may also control the achievement of clearly assigned roles and responsibilities (P7 and P10).

4.2 Framework review

In response to sub-question 2 – How are the findings regarding pandemic governance principles derived from the scientific literature review covered in part 1 of the German ‘national pandemic plan’ and the ‘framework for epidemic situations of national importance’? – both selected pandemic frameworks were analyzed. In the following, part 1 of the German national pandemic plan from 2017 is named ‘NPP 2017’ (referring to Robert Koch-Institut, 2017), the framework for epidemic situations of national importance is named ‘framework 2019’ (referring to Robert Koch-Institut, 2019). For simplicity, the

Robert Koch-Institute is abbreviated RKI in the in-text references. The framework review was conducted in the same structure as the scientific literature review:

4.2.1 Vision & key priorities

In broad terms, the NPP 2017 formulates the following central goals for pandemic governance, which may be seen as the shared vision underlying all action:

- the “reduction of morbidity and mortality in the population,
- ensuring supply of medical care,
- sustaining critical infrastructure, and
- the provision of reliable and timely information for policy makers, professionals, the public and the media” (RKI, 2017, pp. 7-8)

Moreover, the framework 2019 formulates the same overarching goals [vision] of pandemic governance, but adds two more:

- the “prevention of damaging secondary effects, and
- preventing the spread of infectious diseases” (RKI, 2019, p. 1)

Furthermore, the NPP 2017 highlights the importance of societal support as public institutions alone cannot achieve successfully overcoming a pandemic (RKI, 2017, p. 8). This links to Boin (2019) who puts the principle of a strong government mandate (P10) into the legitimacy dimension by arguing that “(...) it is crucial that the ‘crisis owner’ can rely on political and public support” (*ibid.* p. 98).

The NPP 2017 also links to the principle of adapting strategies (P2) by subdividing different epidemiological situations, such as the interpandemic period, the occurrence of isolated cases, or persistent transmission in the population. For each epidemiological situation, different priorities with exemplified measures are formulated (RKI, 2017, table 1.1). While the initial focus is on limiting the incidence of infection, this later switches to protecting vulnerable groups (RKI, 2017, p. 23). More specifically, four levels of key priorities are defined:

- 1) early detection and containment of infections
- 2) protection of vulnerable groups
- 3) mitigation of severe courses and bottlenecks in the health infrastructure, and
- 4) recovery and preparation (RKI, 2017, pp. 23–24).

A compilation of targets and related measures is provided (*ibid.* tables 4.1–4.6). Another key priority is the rapid supply of vaccines to the population (*ibid.* p. 35). Minimizing the risk of infection in the workplace and maintaining business operations is also part of pandemic planning. For this purpose, preliminary considerations for preparing pandemic plans in companies are given (RKI, 2017, pp. 43–

44). In terms of the business sector, the focus is on critical infrastructures (*ibid.* p. 44). Regarding the formulation of key priorities, the framework 2019 presents a general cycle of crisis planning and management (see RKI, 2019, p. 4). The general cycle is divided into five phases, which also represent the structure of the framework: preparation, identification/assessment, controlling/overcoming, subsidizing/recovery, and evaluation. Each phase sets different priorities and tasks. Here, the respective responsible stakeholders shall be experts of their role and responsibility as each individual point like risk assessment or the revision of crisis planning are own complex topics. Regarding surveillance, for example, it is referred to the Sentinel-System by the ‘Arbeitsgemeinschaft Influenza’ (AGI) (*ibid.* p. 8). The framework’s chapters guided by the five central phases ‘preparation, identification/assessment, controlling/overcoming, subsidizing/recovery, and evaluation’ are complemented by one chapter about communication and another about responsibilities/structures. In the chapter about communication, basic advice is given and referred to further frameworks like the WHO Risk Communication-Guideline or the literature review on risk communication conducted by the European Center for Disease Prevention and Control (ECDC) (RKI, 2019, p. 30). Overall, it can be concluded that the NPP 2017 and the framework 2019 formulate many priorities with related tasks and measures. While the NPP 2017 already covers more specific information on issues, the framework 2019 gives a comprehensive list of reference to further specific literature (see RKI, 2019, p. 47 ff.). Both frameworks are characterized by describing existing structures, formulating guiding principles and tasks. However, it remains necessary for stakeholders to study further topic-related literature for in-dept instructions and to acquire relevant experience through practice.

In summary, the concrete principle of building a vision of joint inquiry was not found. Neither the suggestion by Collins et al. (2020, p. 1079) to reflect on positive and negative changes resulting from the crisis. The principles of integrating science into policymaking, to focus on the key nodes in the system, and formulating and reformulating key priorities seem to be covered.

4.2.2 Operations & strategies

A pandemic can mean a long-lasting crisis situation in which existing structures and planned measures must prove their functioning. However, resources may also reach their limits. The necessary measures must be discussed, determined, and initiated on all relevant levels on the basis of situational assessments both globally and for Germany as well as for each regional situation (RKI, 2017, p. 10). Moreover, the NPP 2017 states that “neither the severity of the disease nor the transmission rate at the beginning of the circulation of a new virus can be reliably determined [uncertainty]. These unknown variables must therefore be successively considered when deciding on measures” (*ibid.* p. 23), referring the compilation

of measures in table 4.5. The NPP 2017 emphasized that measures shall differ in escalation or de-escalation levels regarding the regional pandemic situation, which is a continuous process of adaption (ibid. p. 23). However, measures shall be determined by uniform evaluation criteria based on a ‘modular system’ (ibid. pp. 23-24). The diverse measures to be taken differ regarding the target point or the control strategy (ibid. p. 23). “In the case of an emerging pandemic influenza virus, the NRZ Influenza (National Reference Center for Influenza Viruses at the RKI) coordinates and establishes a standard operating procedure in national and international cooperation” (ibid. p. 21). This procedure is a defined 4-step-approach (ibid. p. 21). Furthermore, the framework 2019 states that “specialized laboratories develop standards for laboratory diagnostics” (RKI, 2019, p. 15). Moreover, “experts for outbreak investigations are systematically trained by the RKI, the ECDC and some federal states, for example, according to international standards” (ibid. p. 16). Also, in terms of standardized risk assessment, it is referred to the IGV assessment algorithm (ibid. p. 16) and pointed to the ECDC framework ‘operational guidance on rapid risk assessment methodology’ (ibid. p. 17).

In summary, the principle of flexibly adopting crisis management procedures (P2) seem to be covered by the frameworks. It also appears that issues with ‘transboundary crisis’ highlighted by Boin (2020) are already being addressed. For example, the frameworks elaborate on international interrelations in pandemic governance – with the WHO and EU. Whether more intergovernmental and supranational approaches could be pursued or if reforms are necessary as argued by Boin (2020) cannot be examined in the context of this Bachelor thesis. Relating to Leonard et al. (2020) emphasizing the importance of acting in accordance with guiding processes, it can be stated that the frameworks include guidance for action. However, the particular problem-solving and learning cycle presented by Leonard et al. (2020, p. 3) could be added as new standard operation procedure for so-called ‘rapid innovation’ during crisis. Feedback mechanisms as advised by Kuhlmann (2020, p. 303) appear to be part of pandemic governance planning since the NPP 2017 emphasized, for example, that measures shall differ in escalation or de-escalation levels (based on a ‘modular system’) regarding the regional pandemic situation, and that this must be seen as a continuous process of adaption (ibid. p. 23). However, it would be interesting to evaluate on the use of feedback mechanisms in the course of the COVID-19 pandemic.

4.2.3 Information & communication

§ 3 IfSG defines legally that informing and educating the public about the dangers of communicable diseases and about preventive measures is a task for public authorities. In particular, the responsible federal states agencies shall provide information on the possibilities for infectious disease protection as

well as on advice, care and treatment services (see also RKI, 2019, p. 19). The NPP 2017 emphasizes that situation assessments and necessary measures must be communicated early and transparently (RKI, 2017, p. 10). Decision-making according to a ‘modular system’ also facilitates communicating pandemic governance by public authorities. “For the acceptance of the measures taken, a central point is the dissemination of information both to the professional public and to the population” (*ibid.* p. 25 and see also RKI, 2019, pp. 30-31). Information on the current situation with the latest recommendations on infection protection agreed among the federal states is therefore an integral part of the infection hygiene measures (RKI, 2017, p. 25). The framework 2019 further describes the different information systems and existing structures in chapter 5.2 and 7 (RKI, 2019, p. 30). An elaboration on that would exceed the scope of the thesis here, however. The framework 2019 emphasizes the importance that public authorities coordinate their communication tools, content, and strategies (*ibid.* p. 30). In addition, it is mentioned that confidence-building measures towards the population should have high priority, corresponding references are given in this regard (*ibid.*, pp. 32-33).

In summary, the principle of accuracy of information is also highlighted by the frameworks. Additionally, the framework 2019 refers to further guiding papers dealing with communication. These may cover concrete instructions that even exceed the general remarks made by the reviewed scientific literature. Nevertheless, this hypothesis cannot be answered here since an evaluation of the respective papers would not fit the scope of this thesis. It would be of high relevance to assess public authorities’ communication practices in the context of COVID-19. Furthermore, regarding the framework review, it is not clear if concrete actions are planned and pursued to establish a culture of cooperation for the mutual benefit. Effective communication between scientists and policymakers, as emphasized by Collins et al. (2020), seem to be covered as principle by the frameworks. The NPP 2017 stresses the importance of providing sufficient information to both the professional public and to the population (*ibid.* p. 25), as well. But this Bachelor thesis cannot evaluate on the extent to which science and politics are effectively intertwined in Germany’s pandemic governance.

4.2.4 Critical elements

With regard to inpatient care for diseased, the NPP 2017 provides planning guidance for hospitals, nursing homes, and ambulance services (RKI, 2017, p. 34). Moreover, the increased need for personal protective equipment and for medications must be taken into account in hospital planning (*ibid.* p. 43). An additional problem may be personnel absences due to infections (*ibid.* p. 33). It may be appropriate to establish special focal hospitals for the care of pandemic patients, which some federal states also

already include in their pandemic plans (*ibid.* p. 34). As a matter of principle, it is advised to practice and review pandemic preparedness regularly (*ibid.*, p. 34). Furthermore, chapter 7.2 of the NPP 2017 covers information about stockpiling antiviral medications. Chapter 7.5 indicates that "the federation or federal states do not have stockpiling strategies for other medications than antivirals, such as antibiotics" (*ibid.* p. 41). In this regard, further research about experiences and possible changes through the COVID-19 pandemic would be of interest. § 52b section 1 of the German Medicines Law (Arzneimittelgesetz) has relevance here (see RKI, 2017, p. 41). Also the framework 2019 elaborates on the management of resources: "There is a legal stockpiling obligation for hospitals, hospital suppliers and public pharmacies (in each case, stockpiling of two weeks or one week of the average demand). In addition, the federal states and the federal government are in accordance with § 23 of the Civil Defense and Disaster Relief Act (ZSKG) urged to stockpile medical supplies for scenarios involving a high number of sick or injured people" (*ibid.* p. 26). Resources from the federation reserves can be ordered by the GMLZ which is the 'Joint Information and Situation Center of the Federation and the Federal States' (*ibid.* p. 26).

In summary, the frameworks provide information about understanding and planning with critical elements (P4). An evaluation remains too complex in the scope of this Bachelor thesis.

4.2.5 Roles & responsibilities

The NPP 2017 elaborates on the responsibilities during crisis (RKI, 2017, p. 10): Depending on the specific hazard or damage scenario, the ministry with primary responsibility for crisis management at the federal level is in charge of crisis management. Each ministry has appropriate crisis management structures in place for this purpose. In the event of a pandemic, for example, the Federal Ministry of Health (BMG), as the leading ministry, convenes its crisis team. Liaison persons from other ministries or the federal states can be invited to the meetings. The crisis team is integrated into national and international structures, thus ensuring the pooling of information and the development of strategies to cope with the health emergency. Internationally, the crisis unit and the authorities of the domain are involved in the relevant bodies and rapid alert systems of the EU, the WHO and the Global Health Security Initiative (GHSI).

The Robert Koch-Institute (RKI), subordinate to the BMG, is the central federal institution in the field of public health. Its core tasks are in the fields of disease prevention, surveillance and control. In particular, the RKI covers infectious diseases and conducts epidemiological investigation permanently. The institute develops scientific findings as a basis for health policy decisions (RKI, 2017, p. 10 and 2019, pp. 35-36). The basis for public health actions are the local public health authorities (Gesundheitsämter) (RKI, 2019, p. 33). Their general tasks include the prevention of infectious diseases

through case notification, contact tracing or the decision and implementation of measures (*ibid.* p. 33). However, in the area of communicable diseases, Germany has a key law on federal level called “Protection against Infection Act” (IfSG). Among other regulations, it contains a list of notifiable diseases, which can be extended by the federal states (*ibid.* p. 6). In the disease notification system according to the IfSG, the RKI performs as a vocal point (*ibid.* pp. 6-7, p. 35). The framework 2019 elaborates extensively the fundamentals of the infectious disease control system with its responsibility structures in chapter 7 (RKI, 2019, p. 33 ff.).

In summary, the frameworks present complex structures of roles and responsibilities within the infectious disease control system. In order to uncover weaknesses in clear responsibilities and competences, individual stakeholders would need to be examined.

4.2.6 Expert groups

For emergency preparedness and response, there exist various relevant working groups in Germany. The NPP 2017 describes the main structure in chapter 1.4 (RKI, 2017, pp. 10-13). The framework 2019 elaborates some of them briefly in chapter 7, as well (RKI, 2019, p. 33 ff.). Regarding interdisciplinarity, the framework 2019 highlights that “[e]pidemically significant situations can only be managed quickly and in a resource-saving manner if both governmental and non-governmental institutions as well as private actors work together in an interdisciplinary, coordinated and targeted manner” (RKI, 2019, Vorwort).

Also in regard to expert groups, the frameworks present complex structures within the infectious disease control system. In order to uncover lacking interdisciplinarity or potential for greater use of synergies, particular expert groups would need to be examined, as well. It is not clear if secondary ‘Special Advisory Groups’ proposed by Leonard et al. (2020, p. 6) are established and whether the three types of task forces already exist. This also applies to the principle of flat hierarchies (*ibid.* p. 6).

4.2.7 Government mandates

By reviewing the NPP 2017 and the framework 2019, it appears to be clearly regulated which public authorities are authorized for taking certain decisions or performing particular tasks. This, however, shall be investigated in-depth in terms of the pandemic governance principles from the scientific literature review. Furthermore, the extent to which strong coordination between different actors takes place and whether trust and alliance-building are high must be evaluated, as well.

4.2.8 Vocal points

Germany has information obligations to fulfill in the event of an pandemic due to international and European regulations (RKI, 2017, p. 12). For the WHO, the Joint Information and Situation Center of the Federation and the federal states (GMLZ) acts as a ‘IHR National Vocal Point’ for International Health Regulation (IHR) (ibid. p. 13). According to §§ 3 and 4 IGV-DG, the RKI makes the technical decisions regarding which information is forwarded in the context of communicable diseases (ibid. p. 13). The GMLZ is also in close contact with civil protection situation centers at international level like the European Early Warning and Response System (EWRS) (RKI, 2019, p. 11). The EWRS is operated by the European Center for Disease Prevention and Control (ECDC) (RKI, 2017, p. 13). “For Germany, the RKI serves the system with information in the field of infectious diseases. The system also coordinates the countermeasures of the Member States. In addition, coordination takes place in teleconferences or meetings by the Health Security Committee (HSC) and its working groups. It is composed of representatives of the EU Member States (for Germany the BMG), the European Commission and relevant European agencies. Tasks of this committee are the exchange of information, the coordination of preparedness planning as well as the coordination of crisis management, including risk and crisis communication” (RKI, 2017, p. 13). Furthermore, there are other electronic information systems, such as the Electronic Patient Documentation for recording outpatient treatment of acute respiratory diseases (ARE) and the German Electronic Reporting System for Infection Prevention (DEMIS), whose data is transmitted to the RKI regularly (ibid. p. 17).

In summary, the frameworks generally provide information on the existence of vocal points. Specific cases where an ‘over-arching team’ is missing or already well established need to be evaluated.

5. Discussion & conclusion

In response to sub-question 3 – What conclusion can be drawn from the framework review conducted for answering sub-question 2 in response to the main research question? – it can be concluded that the reviewed scientific literature indeed serves an interesting theoretical viewpoint on evaluating pandemic governance in practice. With its approach, the Bachelor thesis provides an integration of research findings, on the one hand, and a structural analysis of pandemic governance frameworks, on the other hand. The identification of principles and its use as basis for evaluation helps structuring complex crisis scenarios. This makes crises that are particularly difficult to manage, such as a pandemic with its VUCA characteristics, easier to control by breaking them down into smaller scopes of tasks. Thus, the findings

from the integrative literature review with some guiding principles may provide an orientation framework for pandemic preparedness planning and management.

Relating to the main research question, the Bachelor thesis cannot directly answer how pandemic governance could be improved in Germany. However, with its approach of integrating research findings and conducting a first analysis of two pandemic frameworks, it can be helpful for the further evaluation of pandemic governance in Germany. With the structured analysis of scientific literature and practical pandemic frameworks, further research questions have already been formulated. All in all, key points from the reviewed scientific literature are already covered by part 1 of the German national pandemic plan and the framework for epidemic situations of national importance. It would be urgent to evaluate further whether and why there were difficulties in the implementation of given frameworks. Questionnaires and the conduction of interviews with practitioners in crisis management would be reasonable complementary method for further evaluating the findings of the Bachelor thesis. This triangulation would also address a possible selection bias or cognitive bias in case studies, mentioned by George and Bennett (2005, p. 24).

To end this Bachelor thesis, Collins et al. (2020) summarize very well the claim behind this thesis: “Previous crises suggest that COVID-19 may open a ‘window of opportunity’ during which otherwise infeasible changes might be tabled, agreed and implemented” (*ibid.* p. 1078).

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