

University of Helsinki
Dissertationes Universitatis Helsingiensis 80/2024

Reimagining crisis management

Preparedness imagination in an era of chronic socio-ecological crises

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ACADEMIC DISSERTATION

To be presented for public discussion with the
permission of the Faculty of Social Sciences of the University of Helsinki,
in Tekla Hultin, University Main Building,
on the 12th of April 2024, at 12 o'clock

Helsinki 2024

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Cover photo: Helmi Räisänen

Publisher: Helsingin yliopisto

Series: Dissertationes Universitatis Helsingiensis 80/2024

ISBN 978-951-51-9725-2 (print)

ISBN 978-951-51-9724-5 (online)

ISSN 2954-2898 (print)

ISSN 2954-2952 (online)

PunaMusta, Joensuu 2024

To R.I. and her tears of joy

Abstract

Recently, there has been a proliferation of crisis-related concepts in both academic and popular discussions, such as polycrisis, mega-crisis and perma-crisis. The concepts aim to describe the current epoch, characterised by a series of wide, systemic disruptions that are simultaneous, interlinked and cascading. At the same time, climate change, biodiversity loss and other ecological crises are accelerating. These shocks – both fast and slow-paced – reveal fundamental flaws that need to be addressed by reorganising societal structures and institutions. While research on long-term sustainability transition is of utmost importance, the present thesis focuses on how to cope with the already-induced crises while also staying on a sustainable path regarding the long-term future. The thesis explores the juxtaposition of what crisis preparedness is and what it ought to be in the era of chronic socio-ecological crises. The topic is approached by studying empirical material on the preparedness imagination of Finnish public authorities at multiple administrative levels.

Preparedness imagination in the crisis management context refers to established ways of exploring, analysing and addressing ideas about threats that are not apparent in the operational environment through such activities as compiling security strategies, collaboration activities, training and pooling resources. The thesis explores the current preparedness imagination of Finnish authorities to deal with socio-ecological crises. Through analysing their current preparedness imagination, it is possible to make second-order observations about preparedness itself and reveal some of its vulnerabilities. The thesis highlights necessary adjustments for crisis management in the current era of human-induced environmental changes by suggesting ways to broaden the scope of preparedness imagination.

The thesis articles engage with different strands of research, such as crisis management, future studies, simulation and gaming research, and environmental security, which, taken together, shed light on how to reimagine preparedness in the Anthropocene. Qualitative research methods are employed, such as participant observation, interviews and document analysis. The empirical material for the articles was collected in epistemic communities that shape and implement security and preparedness policies. All authorities have a legal obligation to prepare for disruptions. The material makes it possible to analyse their preparedness imagination in multiple domains and at different administrative levels: in a simulated decision-making exercise for municipal policymakers and experts; in national security and preparedness policy documents; at a national expert institute and ministry devoted to pandemic preparedness; and among municipal climate mitigation and adaptation experts and other experts working with unconventional security issues.

The analysis revealed a set of tensions that compromise the current preparedness imagination of authorities. The tension between short-term and long-term time horizons

in their preparedness imagination is formidable. The tension between so-called hard and soft security actors is likewise acute, as is the tension between the operational and strategic level of preparedness. Climate change adaptation and mitigation remain in an unproductive state of tension. In the realm of preparedness exercises, tension exists between exercises that seek to routinise response and exercises that facilitate the exploration of uncertainty. Lastly, as crises never turn out as expected, tension exists between imagined and 'real' crises. I argue that the current preparedness imagination of authorities contributes to an illusion of control in the preparedness regime. The preparedness regime mitigates uncertainty about future threats, while not fully accounting for the ongoing existential and chronic sustainability crisis. The multiple aspects of crises that cross the customary political, functional and temporal boundaries of management are challenging to imagine in the siloed administration, and vulnerabilities stemming from organisations themselves and the ways in which they prepare for crises are not sufficiently considered. Despite its many promising aspects, the current comprehensive security model that guides civil society preparedness in Finland has not allowed a truly cross-sectoral and multidisciplinary preparedness imagination to thrive.

To counter the effects of maintaining an illusion of control, I argue that the preparedness regime needs to better allow for the exploration of uncertainty related to threats. To broaden the scope of the preparedness imagination of authorities, the comprehensive security model would need to truly encourage discourse across different sectors and organisations on just what security entails. Scenarios should be built in a multidisciplinary manner and explored in a cross-sectoral manner. Policy advice should be comprehensive, and authorities should develop a more extensive understanding of systemic threats. Also, I suggest that an innovative simulation exercise, the Policy Operations Room (POR), can be used to expand the preparedness imagination of authorities by allowing them to critically reflect on and probe matters of uncertainty. The PORs provide a platform for testing different actors' planning assumptions in a collaborative setting and could encourage such actors to consider issues that are normally beyond the scope of preparedness policymaking, such as a longer time frame and chronicity. The PORs should be viewed as opportunities to capitalise on feelings of uncertainty to counter the illusion of being in control.

Keywords: preparedness, crisis management, preparedness imagination, socio-ecological crises

Tiivistelmä

Erilaiset kriiseihin liittyvät käsitteet, kuten monikriisi, megakriisi ja permakriisi, ovat yleistyneet viime aikoina sekä akateemisessa että julkisessa keskustelussa. Näillä käsitteillä pyritään kuvaamaan nykyistä aikakautta, jolle ominaista vaikuttaa olevan samanaikaisten, toisiinsa linkittyneiden ja kerrannaisvaikutuksia sisältävien kriisien sarjat. Samaan aikaan ilmastonmuutos, luontokato ja muut ekologiset kriisit kiihtyvät. Nämä häiriöt – sekä nopeat että hitaat – paljastavat, että on perustavanlaatuisia ongelmia, jotka on ratkaistava yhteiskunnallisten rakenteiden ja instituutioiden uudelleenjärjestelyllä. Vaikka tutkimus pitkän aikavälin kestävyyssiirtymästä on äärimmäisen tärkeää, tässä väitöskirjassa keskitytään sen sijaan siihen, miten jo aiheutettuihin kriiseihin voidaan reagoida samalla kun pysytään kestäväällä polulla pitkän aikavälin suhteen. Tässä väitöskirjassa tarkastellaan, millaista kriiseihin varautuminen on ja millaista sen toisaalta pitäisi olla kroonisten sosio-ekologisten kriisien aikakaudella. Aihetta lähestytään tutkimalla empiiristä aineistoa suomalaisista viranomaisista eri hallinnon tasoilla.

Varautumismielikuvitus kriiseihin varautumisen kontekstissa viittaa vakiintuneisiin tapoihin tutkia, analysoida ja käsitellä uhkia, jotka eivät näy operatiivisessa ympäristössä, esimerkiksi laatimalla turvallisuusstrategioita, tekemällä yhteistyötä, harjoittelemalla ja yhdistämällä resursseja. Väitöskirjassa tutkitaan, millaista varautumismielikuvitus on sosio-ekologisten kriisien suhteen suomalaisten viranomaisten keskuudessa. Tämänhetkisen varautumismielikuvituksen analysoiminen auttaa tekemään toisen asteen havaintoja varautumisesta itsestään ja paljastamaan joitakin sen haavoittuvuuksista. Väitöskirja pyrkii osaltaan edistämään varautumisen välttämätöntä mukautumista nykyiseen ihmisen aiheuttamien ympäristömuutosten aikakauteen ehdottamalla keinoja varautumismielikuvituksen laajentamiseksi.

Väitöskirjan artikkeleissa käsitellään eri tutkimussuuntauksia, kuten kriisitutkimusta, tulevaisuudentutkimusta, simulaatio- ja pelitutkimusta sekä ympäristöturvallisuutta, jotka yhdessä valaisevat sitä, miten varautumista voidaan hahmottaa uudelleen antroposeenissa. Tutkimuksessa käytetään laadullisia tutkimusmenetelmiä, kuten osallistuvaa havainnointia, haastatteluja ja dokumenttianalyysiä. Tämän väitöskirjan artikkelien empiirinen aineisto kerättiin turvallisuus- ja varautumispolitiikkaa muokkaavien ja toteuttavien episteemisten yhteisöjen keskuudessa. Kaikilla viranomaisilla on lakisääteinen velvollisuus varautua häiriötilanteisiin. Aineiston avulla voidaan analysoida varautumismielikuvitusta useilla eri aloilla ja eri hallinnon tasoilla: simuloitussa päätöksentekoharjoituksessa kunnallisille päättäjille ja asiantuntijoille; kansallisissa turvallisuus- ja varautumispolitiikkaa ohjaavissa dokumenteissa; valtiollisessa tutkimuslaitoksessa ja ministeriössä pandemiavarautumista koskien sekä kuntien ilmastonmuutoksen hillinnän ja sopeutumisen ja muiden epätavanomaisten turvallisuuskysymysten parissa työskentelevien asiantuntijoiden keskuudessa.

Analyysin perusteella havaitaan joukko jännitteitä, jotka heikentävät viranomaisten varautumismielikuvitusta. Jännite lyhyen ja pitkän aikahorisonttien välillä varautumisessa on vaikuttava. Jännite niin sanottujen kovien ja pehmeiden turvallisuustoimijoiden välillä on voimakas, samoin kuin varautumisen operatiivisen ja strategisen tason välillä. Ilmastonmuutokseen sopeutumisen ja sen hillitsemisen välillä on yhä turhaa jännitettä. Valmiusharjoitusten osalta on jännite niiden harjoitusten välillä, joilla pyritään muodostamaan kriiseihin reagoimisen rutiinia, ja niiden harjoitusten välillä, jotka mahdollistavat epävarmuuden tutkiskelun. Koska kriisit eivät koskaan etene odotetulla tavalla, kuviteltujen ja todellisten kriisien välillä vallitsee jännite. Väitän, että nykyinen varautumismielikuvitus osaltaan ylläpitää illuusiota kontrollista varautumisregiimissä. Varautumisregiimi kesyttää tulevien uhkien epävarmuuden, eikä se ota täysin huomioon eksistentiaalista ja kroonista kestävyyskriisiä. Hallinnon tavanomaiset poliittiset, toiminnalliset ja ajalliset rajat ylittäviä kriisejä on vaikea kuvitella siiloutuneessa hallinnossa, eikä organisaatioista itsestään ja niiden varautumistavoista johtuvia haavoittuvuuksia oteta riittävästi huomioon. Nykyinen kokonaisturvallisuuden malli, joka ohjaa kansallista varautumista Suomessa, ei monista lupaavista piirteistään huolimatta ole mahdollistanut aidosti poikkisektoraalisen ja monialaisen varautumismielikuvituksen kukoistamista.

Väitän, että kontrollin illuusion vaikutusten torjumiseksi varautumisregiimin on mahdollistettava paremmin uhiin liittyvän epävarmuuden tarkastelu. Varautumismielikuvituksen laajentaminen edellyttää, että kokonaisturvallisuuden malli todella kannustaisi eri aloja ja organisaatioita keskustelemaan yhdessä siitä, mitä turvallisuus on. Skenaarioita tulisi laatia monitieteellisesti ja niitä tulisi tutkia poikkisektoraalisesti. Poliittisen neuvonannon olisi oltava kattavaa, ja systeemisten uhkien ymmärtämistä olisi kehitettävä. Lisäksi ehdotan, että innovatiivista valmiusharjoitusta, politiikkapäämajaa (Policy Operations Room), voidaan käyttää varautumismielikuvituksen laajentamiseen, sillä se mahdollistaa kriittisen pohdinnan ja epävarmuuden tutkimisen. Poliitiikkapäämaja tarjoaa alustan, jossa eri toimijat voivat yhdessä haastaa suunnittelua ohjaavia oletuksiaan, ja joka voisi kannustaa varautuvia toimijoita pohtimaan asioita, jotka tavallisesti jäävät varautumisen ulkopuolelle, kuten pidempää aikajännettä ja kroonistuvia olosuhteita. Poliitiikkapäämajaa voitaisiin käyttää tilaisuutena ruokkia epävarmuuden tunnetta, mikä voi auttaa kontrollin illuusion purkamisessa.

Avainsanat: varautuminen, kriisien hallinta, varautumismielikuvitus, sosio-ekologiset kriisit

Acknowledgements

First, I would like to thank those who funded my research. This research was conducted as part of the WISE project (*Creative adaptation to wicked socio-environmental disruptions*, <https://wiseproject.fi/en/>), a large multi-disciplinary research consortium focusing on the governance of wicked socio-ecological disruptions in Finland (2018–2023). WISE was formed by six research teams from five different Finnish universities and research institutions. The project, including this thesis, was funded by the Strategic Research Council at the Academy of Finland (grants 312623 and 336253).

I have had the privilege of working alongside many amazing and inspiring colleagues. Their contributions have enriched this work immeasurably, and this thesis would not have been possible without them.

Most importantly, I am immensely grateful to my supervisors, Professor Janne I. Hukkinen and Professor Jussi T. Eronen, for their support and wisdom. Your guidance has been instrumental, and I could not have asked for better mentors! Thank you also for being my *custos*, Janne. I have learned so much about academia and the world by being part of Janne's Environmental Policy Research Group (EPRG) and Jussi's Past Present Sustainability Research Unit (PAES). Our interdisciplinary discussions, particularly those centred around reindeer herding, have been intellectually stimulating and enriching. The support from EPRG and PAES colleagues lifted me during moments of self-doubt.

I extend heartfelt thanks to Associate Professor Ann Keller from the University of California, Berkeley, and Professor Sissel Haugdal Jore from the University of Stavanger. Thank you for your time and dedication as pre-examiners. I am very honoured and excited to have Professor Magnus Ekengren from the Swedish Defence University as my opponent. Your work on crisis management has been a great source of inspiration for me. I also wish to thank Professor Eva Heiskanen and Associate Professor Tuomas Ylä-Anttila for representing the Faculty of Social Sciences in the grading committee.

I am indebted especially to you, my co-authors, fellow WISE researchers – including Emma Hakala, Paavo Järvensivu, Nina Janasik, Annukka Lehikoinen, Mikko J. Virtanen, Sakari Kuikka, Peter Lund, Janne and Jussi – for your collaboration and contributions to this research effort. Furthermore, I would like to express my gratitude to the entire research consortium. The exchange of ideas and

collective effort within the group have profoundly impacted my growth as a researcher. I am truly fortunate to have been a part of such a vibrant and intellectually stimulating community.

Particularly, I wish to express my deep admiration for the members of the BIOS research unit. In my eyes, you are the wisest individuals on earth, and I am privileged to have had the opportunity to learn from you. I am very grateful to you, Karoliina Lummaa from BIOS, for being in my thesis committee.

I appreciate the insights and encouragement provided by the members of the Doctorate via peer support group. I also wish to express my appreciation to the participants of Janne's environmental policy research seminars for all the enlightening discussions.

I am very grateful to Ossi Heino and Matias Heikkilä from Tampere University for taking the time to discuss preparedness with me in March 2023 and for inspiring me to study preparedness imagination. Though my own contributions pale in comparison to the depth of their innovative work, I am honoured to have had the opportunity to engage with their concepts and insights.

Visits to Kilpisjärvi research station marked both the beginning and end of my thesis journey. The breathtakingly beautiful nature of the area left an indelible impression on me, but even more significant were the kind-hearted people I had the privilege of meeting there. I am still impressed by Rauni Partanen's encyclopaedic knowledge of arctic-alpine plant species. I would like to give special thanks to Leena Valkeapää for her warm presence, which made it easier to withstand the impressive minus forty degrees Celsius.

I am profoundly grateful to you, Professor Timo Kaartinen, for your role in introducing me to the captivating world of anthropology at a pivotal moment in my career transition from architecture to social and cultural anthropology. Your encouragement and mentorship have been instrumental in shaping my academic trajectory.

I am deeply grateful to the Finnish Institute for Health and Welfare for the enriching experience of working within the infectious diseases unit during my master's studies. My time there provided invaluable insights into public health efforts, offering a unique perspective distinct from my own field of study. In particular, I would like to express gratitude to Jussi Sane. Thank you for your support and cheerfulness. It is a privilege to have you as part of my thesis committee.

I truly appreciate all the interviewees and participants who generously shared their time, insights, and experiences for the study. Your willingness to participate and your openness in sharing your perspectives have played a vital role in the research project.

I am grateful to Antto Vihma and Emma Hakala for offering me the opportunity to work in the Finnish Institute of International Affairs (FIIA) for the next few years,

and, of course, I want to thank the National Emergency Supply Agency (NESA) for funding our security of supply project. I extend my gratitude to Tapio Tourula from NESA for his invaluable guidance and support on the topic. Emma, do you remember that we promised to sing karaoke when we finish our project? I have also had the pleasure of (re)connecting with Karoliina Hurri at FIIA. I want to thank you for your patience in answering my countless questions throughout the finalisation of my thesis and for tolerating my unconventional habits, like lying on the floor during breaks at work.

I must extend my gratitude to the unknown librarian at Rikhardinkatu Library for displaying Liisa Malkki's book (*Kulttuuri, paikka ja muuttoliike*), which sparked my academic journey in 2012. I am very happy I was eventually able to meet Liisa in person. I will always cherish the memory of her encouraging words and her warm hug.

This thesis would not have been possible without the support of my dear friends, who bring light and meaning to my life. I am grateful for the years spent with the Helsingin Kuvataidelukio gang; having such a long-standing group of friends is a privilege! To the anthropology gang, thank you for all the insightful and silly moments we have shared together. My ex-neighbour and childhood pen pal, Marjaana, I would not exist without you. I am also thankful to my lovely Spanish-Finnish friends, Santi and Minna, and to little Lili, Matilda and Eliel. Thank you for being there for me. Gratitude extends to the P.E.T.O.S. (*Poikkiteollisuuden Ekologiset Taloudellisen Oppimisen Seura*) meetings for making me a bit wiser and for sharing both donuts and frustrations about economics with me. Additionally, I am also grateful to the lindy hop community, whose members unknowingly provided me with much-needed respite from the ecological grief and existential anxiety brought on by anthropogenic environmental changes. Lauri, thank you for every triple step and rock step we have taken together.

To my family, your love and support sustain me. I truly appreciate my amazing sister for always being there for me. Your encouragement has helped shape me into the person I am today, and I am endlessly grateful to have you as my sister. Little Aapo, I eagerly anticipate the joy you will bring. Jani, thank you for being a part of our lives. Dad and Tarja, your support means the world to me. Thank you.

My dearest L.D., thank you for making me smile every single day. You have the remarkable ability to make even the simplest moments feel extraordinary. It is a privilege to have you by my side! Your love has enriched my life in ways I never thought possible.

Helmi Räisänen
Helsinki, 08.03.2024

List of abbreviations

ECDC European Centre for Disease Prevention and Control

POR Policy Operations Room

STM [Sosiaali- ja terveysministeriö] Ministry of Social Affairs and Health

THL [Terveyden ja hyvinvoinnin laitos] Finnish Institute for Health and Welfare

UNDRR United Nations Office for Disaster Risk Reduction

WHO World Health Organization

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List of original publications

This thesis is based on the following publications:

- I Räsänen, H., Eronen, J. T., & Hukkinen, J. I. (2023). Imagining the next pandemic: Finnish preparedness for chronic transboundary crises before and during COVID-19. *Risk, Hazards & Crisis in Public Policy*, 14(3), 226–246. <https://doi.org/10.1002/rhc3.12271>
- II Räsänen, H., Hakala, E., Eronen, J. T., Hukkinen, J. I., & Virtanen, M. J. (2021). Comprehensive Security: The Opportunities and Challenges of Incorporating Environmental Threats in Security Policy. *Politics and Governance*, 9(4), 91–101. <https://doi.org/10.17645/pag.v9i4.4389>
- III Hukkinen, J. I., Eronen, J. T., Janasik, N., Kuikka, S., Lehtikoinen, A., Lund, P. D., Räsänen, H., & Virtanen, M. J. (2022). The policy operations room: Analyzing path-dependent decision-making in wicked socio-ecological disruptions. *Safety Science*, 146, 105567. <https://doi.org/10.1016/j.ssci.2021.105567>
- IV Järvensivu, P., Räsänen, H., & Hukkinen, J. I. (2021). A simulation exercise for incorporating long-term path dependencies in urgent decision-making. *Futures*, 132, 102812. <https://doi.org/10.1016/j.futures.2021.102812>

The publications are referred to in the text by their roman numerals.

The author's contributions in co-authored publications are based on an adapted version of the Contributor Roles Taxonomy (CRediT): <https://doi.org/10.1002/leap.1210>.

Author's contributions in co-authored publications

AL = Annukka Lehtikainen; EH = Emma Hakala; HR = Helmi Räisänen; JE = Jussi T. Eronen; JH = Janne I. Hukkinen; MV = Mikko J. Virtanen; NJ = Nina Janasik; PL = Peter D. Lund; PJ = Paavo Järvensivu; SK = Sakari Kuikka

Contribution	Article I	Article II	Article III	Article IV
Conceptualisation	HR, JE, JH	EH, HR, JE, JH, MV	AL, HR, JE, JH, MV, NJ, PL, SK	HR, JH, PJ
Methodology	HR	EH, HR	AL, HR, JE, JH, MV, NJ, PL, SK	HR, JH, PJ
Investigation and analysis	HR	EH, HR	AL, JH, NJ, HR	HR, JH, PJ
Data Curation	HR	EH, HR	AL, HR, NJ	HR, PJ
Writing – original draft	HR	EH, HR	HR, JH	HR, PJ
Writing – review and editing	HR, JE, JH	EH, HR, JE, JH, MV	AL, HR, JE, JH, MV, NJ, PL, SK	HR, JH, PJ
Visualisation	HR		JH	JH, PJ
Supervision	HR, JE, JH	JH	JH	JH, PJ
Project administration	JE, JH	JH	JH	JH, PJ
Funding acquisition	HR, JE, JH	JE, JH	JE, JH, PL, SK	JH, PJ

Article I was co-authored with Jussi T. Eronen and Janne I. Hukkinen. The idea for the article was developed collaboratively. I gathered the data from various sources, enabling data triangulation, and I analysed the data and wrote the original draft. Everyone took part in the reviewing and editing process. I managed the administrative work and funding of the data collection process in 2017–2018, while Eronen and Hukkinen supervised and funded the research that was done in 2021.

Article II was co-authored with Emma Hakala, Jussi T. Eronen, Janne I. Hukkinen and Mikko J. Virtanen. The interview material had been collected previously as part of the WISE project. Hakala and I developed the idea for the article, conducted the data analysis and wrote the original draft together – Hakala, though, was in charge of the theory section of the draft. All the authors took part in reviewing and editing the text.

Article III was co-authored with Janne I. Hukkinen, Jussi T. Eronen, Nina Janasik, Sakari Kuikka, Annukka Lehtikoinen, Peter D. Lund and Mikko J. Virtanen. The conceptualisation and methodology components of the article were developed collaboratively. Together with Hukkinen, Lehtikoinen and Janasik, I was observing one type of the POR exercises and took part in the data curation process. I wrote part of the original draft based on existing simulation exercise studies and took part in reviewing and editing the rest of the article.

Article IV was co-authored with Paavo Järvensivu and Janne I. Hukkinen. The conceptualisation and methodology components of the article were developed collaboratively. While Hukkinen led the exercise, Järvensivu and I observed the exercise and managed the data curation process. I wrote section 2 of the original draft based on existing simulation exercise studies and took part in reviewing and editing the rest of the article, while Järvensivu was in charge of writing the remainder of the original draft.

1 Introduction

1.1 Preparedness in an era of chronic socio-ecological crises

Welcome to the world of the polycrisis. (Tooze, 2022a)

Within a time span of a few years, we have endured a pandemic, supply chain issues, Russia's attack on Ukraine, an energy crisis in Europe, global food insecurity and stagflation. At the same time, climate change, biodiversity loss and other ecological crises are accelerating (IPBES, 2019; IPCC, 2023). In the Anthropocene, the customary rules of thumb in natural resource management are increasingly becoming obsolete (Kaaronen et al., 2021). The shocks – both fast and slow-paced – reveal fundamental flaws that need to be addressed by reorganising our societal structures and institutions. While research on long-term sustainability transition is of utmost importance, here the focus is on how to cope with the already-induced crises while also staying on a sustainable path regarding the long-term future. This thesis explores the relationship between what preparedness *is* and what it *ought* to be in an era of chronic socio-ecological crises. The topic is approached by studying empirical material on *preparedness imagination* among Finnish public authorities. In other words, the focus is on the conditions that shape the imagining of possible future harm or the threat landscape of crisis management.

Recently, there has been a proliferation of crisis-related concepts in both academic and popular discussions. *Polycrisis* is one of the concepts used to describe the current state of the world, where a mix of challenges interact with and amplify each other (Davies & Hobson, 2022; Tooze, 2022b). The concept of *mega-crisis* has likewise gained currency among futures scholars. For example, William Halal uses the concept to describe the fact that 'a difficult passage to a rather different world' is taking place, as illustrated by 'climate change, energy shortages, financial instability, and other yet unforeseen threats' (Halal, 2013, p. 392). Furthermore, Collins English Dictionary declared *permacrisis* the word of the year in 2022, defining it as 'an extended period of instability and insecurity', especially 'one resulting from a series of catastrophic events' (see also Bushby, 2022).

The crisis-related concepts point towards the idea that we have entered an era characterised by a series of systemic, overlapping and cascading disruptions. This is an important characteristic of the Anthropocene, the current geological epoch, in

which human activity is the dominant cause of changes in Earth's land surface, oceans and atmosphere (Lewis & Maslin, 2015). Gradually, some of the human-induced environmental changes have gained a central position in policy debates. The first step in such a shift was an increased awareness of the dangers of climate change, especially with the third and fourth IPCC reports in 2001 and 2007, respectively, stating that most of global warming in the last 50 years is attributable to human activities and that such warming has already been causing significant damage. Then, more recently, an awakening to the quite real possibility of a sixth mass extinction has taken place, as it has become clear that the rate of human-induced species loss is up to 100 times higher than the usual 'background' rate (Ceballos et al., 2015; see also Barnosky et al., 2011). Yet, inadequate action to remain within the planetary boundaries (Steffen et al., 2015) has resulted in the truly unique historical condition of multiple intertwined crises of overconsumption, climate change, ecosystem destruction, disease spillovers and so forth (e.g. Barnosky et al., 2016; Lähde, 2023).

In the Anthropocene, social and ecological *systems* are deeply entangled (e.g. Dorninger et al., 2021; Nyström et al., 2019; Reyers et al., 2018). Earlier research has theorised about, for example, *systemic risks* as threats that emerge within *one* natural, technical or social system, which then impact other systems. However, the Anthropocene has the potential for polycrises, where multiple systemic risks interact and amplify each other. (See Janzwood & Homer-Dixon, 2022.) To further highlight my interest in the systemic entanglement between social and ecological systems, I use the concept of *socio-ecological crises* in this study. The socio-ecological attribute stems from a socio-ecological systems framework, which emphasises the interdependencies between humans and nature (see Colding & Barthel, 2019).

I understand socio-ecological crises to be related to the disruptive changes in the Earth system caused by human activity (their social systems) that exceeds planetary boundaries. The boundaries constitute the environmental limits within which humanity can safely operate (see Steffen et al., 2015). Socio-ecological crises, like climate change and ecosystem destruction, can materialise as, for example, supply chain issues, extreme weather events and geopolitical tensions related to energy transition (see Article II). In this sense, pandemics can also be approached as socio-ecological crises: the likelihood of disease emergence and new epidemics is increasing as human-induced global environmental change advances (see, e.g. Carlson et al., 2022; Marani et al., 2021; van Doorn, 2014). When humans push wildlife into narrower spaces, they create more opportunities for pathogen sharing between humans and, for example, minks (Yle News, 2023) or birds (Sonnberg et al., 2013). Once a novel pathogen is able to infect humans, the globalised transportation network will effectively spread it around the world. Also, the case of the COVID-19 pandemic, with its unexpectedly long time frame, showed that

pandemics can reach chronic states similar to environmental degradation (see Article I).

To do justice to the fact that we live in the Anthropocene, which holds the potential for repetitive, interlinked crises that undermine attempts to return to normalcy, I refer to *chronic* socio-ecological crises. When appropriate, I also use other attributes like *transboundary* or *creeping*. For example, the creeping crisis concept is useful for analysing the divergence between the attention paid to a crisis and its actual damage potential (see Article I), but it does not readily suggest the potential for multiple, interconnected systemic crises. As shown in detail in Article I, chronic socio-ecological crises can continue to deplete a society's capacities over time, further constraining responses to the next crisis. Chronic socio-ecological crises, with their systemic aspects, defy simplistic solutions – and furthermore, such solutions might, in contrast, create new crises and thus undermine management efforts. For example, carrying out a successful energy transition with a heavy use of biomass would exacerbate biodiversity decline (see Lähde, 2023).

Living in an unprecedented historical era called the Anthropocene means that there is a chronic state of uncertainty. For example, humanity has no track record of surviving in times equivalent to the projected global warming events. As Ville Lähde (2023) put it: 'The CO₂ levels in the atmosphere are higher than ever in human history, global human-made mass exceeds all living biomass, wild mammals make up only around 4 percent of mammals, and a new mass extinction is already in the works.' On the one hand, the underlying assumptions regarding what is normal might have to be adjusted more frequently than before, especially when attempting to make strategies and investments with a longer time frame. What used to be a 1000-year event can soon become a 100-year event. On the other hand, many natural systems have tipping points, such as the collapse of the Atlantic meridional overturning circulation (Ditlevsen & Ditlevsen, 2023), which can result in unforeseen and non-linear changes. All in all, the conventional way of learning lessons from past crises in order to better manage the next one might prove an obsolete strategy in the Anthropocene (see e.g., Lähde, 2023; UNDP, 2022).

This thesis builds on the concept of preparedness imagination proposed by Heino et al. (2022) and applies it to an analysis of a rich set of empirical data. The analysis of preparedness imagination sheds light on the epistemic conditions that allow authorities to make sense of emerging socio-ecological threats of extraordinary uncertainty and complexity. Preparedness imagination refers to the ability to explore ideas about threats that are not apparent in an operational environment. It can be understood as the 'systematic mechanism by which various threats are thought to be addressed through the mobilisation of capacities within a society', including 'exercising powers, pooling resources, coordinating activities, and focusing attention on the most essential threats in order to prevent and address them in an effective way' (Heino et al., 2022, p. 2). In this study, *preparedness*, as

an aspect of crisis management, refers to anticipatory, future-oriented practices, discourses and policies that aim to build capacities for managing future crises (see Chapter 2.2; Chapter 3.1). Since the empirical material is from Finland, the thesis is also a case study of the Finnish comprehensive security model for civil society preparedness. In this study, I use the concept of *preparedness regime* to refer to the established crisis preparedness governance system and its wide range of actors and actions (see Chapter 3.1).

The thesis articles engage with future studies, a range of studies on crisis management and environmental security as well as simulation and gaming research. Preparedness imagination is analysed in multiple domains, such as in the national security and preparedness policy documents (Articles I, II), at a national expert institute and ministry (Article I), among a broad array of practitioners at multiple levels of administration (Articles II) and in a simulated decision-making exercise for municipal policymakers and experts (Article III; Article IV). Together, the various domains allow for a multi-level and multi-sector analysis of preparedness imagination. The present summary article of the thesis and its main findings contribute to existing crisis management literature by offering an in-depth analysis of how preparing for and detecting socio-ecological threats can be compromised by a rather narrow preparedness imagination. Furthermore, research on one established aspect of preparedness – simulation exercises – is foregrounded in this thesis, in which I present a novel kind of exercise, the Policy Operations Room (POR), as a way of institutionalising the use of imagination in preparedness practices. Similar exercises that track a series of urgent decisions and their long-term path dependencies are rare.

The empirical material for the different articles was collected among different epistemic communities that shape and implement security and preparedness policies. The epistemic communities' understanding of emerging crises, of the appropriate security actors and of adequate preparedness practices is treated as performative since they strongly shape how national preparedness and response efforts are organised. For example, authorities' 'narratives, perceptions and interpretations' of disruptions facilitate 'certain options and actions while constraining others', and therefore, they 'have effects on the material, political and social worlds' (Lidskog, 2018, pp. 2–3): defining a specific crisis as something that may become more regular over time has different implications for learning and the restructuring of organisations than a crisis that is seen as exceptional (Lidskog, 2018). As illustrated in Article I, the studied pandemic experts significantly contribute to national crisis management efforts by providing expert advice. They also take part in compiling national biological threat scenarios (Ministry of the Interior, 2019) and the national pandemic preparedness plan (Ministry of Social Affairs and Health, 2012), which other sectors use in their preparedness work.

Thus, preparedness imagination in one sector conditions the preparedness of other sectors as well.

The analysis of preparedness imagination allows me to make second-order observations (to observe the observations being made) about the current ways of preparing for socio-ecological crises in Finland. The analysis helps reveal vulnerabilities generated by the preparedness regime itself. As its main result, the thesis outlines a set of tensions that compromise the ability to address socio-ecological crises. Additionally, it contributes to the necessary adjustments in preparedness measures to best respond to the current era of human-induced environmental changes by exploring ways to broaden the scope of preparedness imagination. The policy relevance of the results stems from the fact that one of the key challenges for the near future is to find a balance between responding to environmental urgencies while coping with decadal-scale path dependencies (Article I). The analysis will show how the preparedness regime efficiently tames uncertainty and complexities related to potential threats and maintains an illusion of control. To counter the effects of maintaining an illusion of control, I argue that the preparedness regime needs to better allow for the exploration and acknowledgement of deep uncertainty related to potential threats. Opportunities, such as the POR, should serve as a means to come to terms with feelings of uncertainty instead of suggesting strong control of the operating environment.

I do not argue that preparedness work should be allotted unlimited material resources to anticipate all imaginable threats. Rather, the study investigates *how* current resources are being used by examining a set of well-established preparedness efforts (see Chapter 3.1). For example, extensive resources and cross-sectoral cooperation contributed to the adopting of a national pandemic plan in 2012 (Ministry of Social Affairs and Health, 2012). Choosing to base the plan on a scenario involving an influenza pandemic that is treatable with a vaccine is more a question of preparedness imagination than simply of resources. Similarly, we might observe that the use of exercises is a common practice among Finnish authorities (on the linkages of education and security policy, see Valtonen & Branders, 2020), so we might as well ask why the exercises are conducted in such a manner. Yet, I acknowledge that resource constraints seriously affect the level of preparation of different authorities. From the perspective of this thesis, a point of interest is that preparedness imagination has serious implications for how resources are distributed. For example, if local and direct environmental threats are considered low and under control and indirect risks are not recognised (Article II; Pilli-Sihvola et al., 2018), then resources are most likely going to be allocated elsewhere.

Finland is a Nordic welfare state with a population of 5.5 million people. It is a wealthy and stable EU member state with well-functioning governance structures (Pilli-Sihvola et al., 2018). The country takes a comprehensive approach to security and has a long history of preparedness (Chapter 3.1; Pilli-Sihvola et al., 2018;

Meriläinen et al., 2020; Valtonen & Branders, 2020). Finland offers a chance to study an area where the cascading effects of environmental change are significant, while the local, direct impacts are rather minimal (see Meriläinen et al., 2020; Pilli-Sihvola et al., 2018). In international comparisons on vulnerabilities to climate change, Finland has been ranked one of the least vulnerable countries (Pilli-Sihvola et al., 2018). However, vulnerability to crises is not equally distributed in the country; economic inequality has been on the rise and so have the impacts of climate change (Meriläinen et al., 2020). Furthermore, researchers studying Finland have warned that the indirect impacts of climate change will likely outweigh any positive ones, as the country is strongly connected to the rest of the world (Pilli-Sihvola et al., 2018; see also Hakala et al., 2019a, 2019b), which puts the current complacency in a questionable light.

While this thesis focuses on Finnish authorities at multiple administrative levels, it is acknowledged that Finnish preparedness against various socio-ecological crises is impacted by the supra-national level, for example in the form of the European Union Civil Protection Mechanism or the Floods Directive (see Pilli-Sihvola et al., 2018). Improving cross-border cooperation in crisis management is an urgent task and should be carefully considered by researchers and practitioners alike (e.g. Pilkington et al., 2022). However, even during the transboundary COVID-19 pandemic, the primary actors for protecting people's health have been nation-states, and European countries responded to the pandemic in an uncoordinated manner (Bouckaert et al., 2020). National, regional and local authorities remain important objects of investigation for crisis management research.

The Finnish comprehensive security model (Chapter 3.1) claims to promote preparedness in order to maintain the prerequisites of democracy and safeguard the rights of individuals (Prime Minister's Office, 2017). The model seemingly supports the kind of broadening of security measures that takes place within the sphere of democratic decision-making (Article II). While it is of utmost importance to mitigate creeping socio-ecological crises, such as climate change and biodiversity loss, it can also be thought that preparing for the negative impacts in a proactive manner will help protect society against non-democratic emergency measures. With a more broad-based preparedness imagination, the comprehensive security model could better help to protect democracy. I believe that the most cost-effective way of building preparedness in a welfare society like Finland would be to prevent and mitigate the socio-ecological crises that will likely impact Finland indirectly (see, e.g. Pilli-Sihvola et al., 2018). At the same time, it should be acknowledged that at the global scale, climate change mitigation targets are not likely to be met and considerable adaptation is needed (see IPCC, 2023).

1.2 Research questions

To explore and synthesise the findings of the individual articles, I answer the following research questions in the thesis summary:

1) What factors prevent the current preparedness imagination of authorities from recognising socio-ecological crises in Finland?

2) How can the scope of their preparedness imagination be adjusted to better address chronic socio-ecological crises?

In answering the first question, I describe the current preparedness imagination of Finnish authorities regarding socio-ecological crises. My analysis of their preparedness imagination in the empirical cases involving the Finnish comprehensive security model, pandemic preparedness and simulation exercises in Finnish municipalities sheds light on the epistemic conditions that allow authorities to make sense of potential threats. By observing the preparedness regime's observations (epistemic work) about the operational environment, about the appropriate security actors and about the nature of adequate preparedness practices, I suggest that a set of tensions (see Chapter 4.1) condition the Finnish preparedness imagination. Then, to answer the second research question on adjusting or broadening the scope of authorities' preparedness imagination, I explore ways to mitigate the identified tensions.

1.3 Summary of the articles

The thesis consists of four articles. Below, I summarise each article from the standpoint of how they contribute to the analysis of preparedness imagination.

1.3.1 Article I

Räisänen, H., Eronen, J. T., & Hukkinen, J. I. (2023). Imagining the next pandemic: Finnish preparedness for chronic transboundary crises before and during COVID-19. *Risk, Hazards & Crisis in Public Policy*, 14(3), 226–246. <https://doi.org/10.1002/rhc3.12271>

This study analysed pandemic preparedness among Finnish infectious disease experts at the central government level before and during the COVID-19 pandemic (2017–2021). The study is based on interview material, participant observation in the Finnish Institute for Health and Welfare's infectious disease unit in 2017, and health security-related document analysis. By analysing expert perceptions of preparedness at two points in time, the study provided insights on the challenges that such increasingly transboundary crises have posed for the preparedness imagination of officials. The analytical focus was on the temporal aspects of the

transboundary COVID-19 crisis, and the pandemic case was taken as an opportunity to study the existing capacities to make sense of and manage chronic socio-ecological crises.

The study illustrates how the transboundedness of the COVID-19 pandemic challenged planning assumptions that had been shaped by the much simpler 2009 H1N1 pandemic. The boundary crossing nature of COVID-19 seriously tested the current crisis management regime, which is based on a short-term response implemented by clearly identifiable responsible authorities and a subsequent return to normalcy. According to the experts, narrow scenario work restricted the applicability of processes to the COVID-19 pandemic, and preparedness efforts had not fully considered the non-epidemiological aspects of epidemics. The experts suggested that pandemic preparedness planning would benefit from a more generic approach and from adhering to more comprehensive expert advice. The pandemic case indicates that in an era of transboundary crises, crisis management needs to move beyond sector-specific and monodisciplinary approaches and develop a way of analysing and preparing for systemic threats. How to manage prolonged transboundary crises merits more consideration in future preparedness studies.

1.3.2 Article II

Räisänen, H., Hakala, E., Eronen, J. T., Hukkinen, J. I., & Virtanen, M. J. (2021). Comprehensive Security: The Opportunities and Challenges of Incorporating Environmental Threats in Security Policy. *Politics and Governance*, 9(4), 91–101. <https://doi.org/10.17645/pag.v9i4.4389>

Article II provides an analysis of preparedness imagination related to environmental threats. The article draws from environmental security studies that look at the interaction of threats between environmental change and society (e.g. Dalby, 2002). Environmental security refers to the links between environmental change and broader human security issues, including such aspects as health, welfare, livelihoods and food (e.g. Adger, 2000; Matthew et al., 2010; Sygna et al., 2013). The study is based on a set of expert interviews (n = 40) with persons from a wide range of fields relevant to unconventional security issues, but also with more traditional security actors (see Chapter 3). The topic was approached by evaluating the capacity of the Finnish comprehensive security model to address environmental changes through a three-level framework of local, geopolitical and structural environmental security impacts (see Hakala et al., 2019a, 2019b). The article analyses whether the current preparedness imagination of authorities covers the different kinds of environmental security impacts that have been identified in earlier research: local impacts that directly affect individuals and communities, such as extreme weather events; geopolitical impacts that are indirect because they

are combined with cross-border and political factors and result from chains of events; and the structural impacts of mitigating and adapting to environmental change itself, since, for example, the necessary structural changes made to the economic and political systems might cause unrest if done in a socially unjust manner or decarbonisation efforts might have security impacts in the field of international relations.

Based on the central policy document (Prime Minister's Office, 2017), we identified several opportunities for the Finnish comprehensive security model to address environmental threats: through the model's cross-sectoral approach, its proactive outlook, its broad-based understanding of security actors and its applicability at multiple levels. The notion of comprehensive security is representative of an ongoing attempt to broaden the range of security actors in Finland. Some interviewees reported that the model has helped them organise a diverse array of actors to respond to complex, indirect threats like hybrid influencing, cybersecurity issues and climate change. However, our study shows that the model's opportunities for addressing such threats have not been fully realised and that the main challenges of incorporating environmental issues into security policy are related to their long-term, cross-sectoral and cascading character.

1.3.3 Article III

Hukkinen, J. I., Eronen, J. T., Janasik, N., Kuikka, S., Lehtikoinen, A., Lund, P. D., Räisänen, H., & Virtanen, M. J. (2022). The policy operations room: Analyzing path-dependent decision-making in wicked socio-ecological disruptions. *Safety Science*, 146, 105567. <https://doi.org/10.1016/j.ssci.2021.105567>

Human-induced environmental changes have pushed the Earth's socio-ecological systems into an era of chronic, complex and rapid disruptions, which call for rapid, intuitive decision-making and the effective implementation of policy measures. Yet, the complexity, interconnectedness and long lead times of the problems would require the thoughtful and time-consuming weighing of evidence by a broad range of experts. This article presents the Policy Operations Room (POR), a framework that resolves the dilemma by bringing together the need for urgent decision-making and long-term planning. It is a simulation exercise that immerses the policymakers in a 'time machine' that combines the real-time reliability management of control rooms with long-term planning for crisis avoidance and preparedness. The POR framework can support the ability to explore ideas about complex threats that are not (yet) apparent in the operational environment, and thus, it is a platform that can help broaden the scope of authorities' preparedness imagination. The article presents the theoretically grounded design principles underpinning the POR

simulation exercise and discusses the tentative empirical results from the first POR experiments. Three variations of the POR are presented, each differing in the amount of available knowledge and in the emphasis on preparedness versus response.

The preliminary results presented in the article show that the Path-POR we organised in Helsinki in 2019 (see Article IV) failed to seriously challenge the decision-makers to consider the long-term consequences of their decisions. Also, the expert participants were not properly engaged during the exercise. Therefore, only experts and administrators were invited to attend the next POR, a Bayes-POR organised in Kotka. More concrete and quantitative scenario paths were successfully explored with the participants. Finally, based on observations made at a Crisis-POR in southern Finland, we concluded that gaining a shared situational awareness for the purposes of considering the long-term consequences of a crisis is quite challenging. The further development of the POR in subsequent projects is also presented in the paper, as the POR has the potential to contribute to novel styles of decision-making in the Anthropocene.

1.3.4 Article IV

Järvensivu, P., Räisänen, H., & Hukkinen, J. I. (2021). A simulation exercise for incorporating long-term path dependencies in urgent decision-making. *Futures*, 132, 102812. <https://doi.org/10.1016/j.futures.2021.102812>

The article describes the design and execution of one Path-POR exercise, organised in Helsinki in 2019. Top politicians and a group of senior experts from the City of Helsinki participated in the half-day exercise, as did the researchers and city officials who organised and observed the exercise. The article incorporates a review of simulation and gaming research that provides both the design drivers for the POR exercise and a set of criteria for evaluating the success of the exercise in providing a learning platform for the participants.

The POR is a concrete tool for broadening the scope of preparedness imagination, especially in relation to the time scale of crises. The POR was designed to make the future present for the participants through both imagination and performance, and it invited the participants to use their imagination to explore alternative futures and critically reflect on their models of thought. The Path-POR simulation exercise allowed the participants to explore the connections between the short- and long-term time horizons of decisions by having them travel to imagined futures at ten-year intervals. At each point in time, their decisions would shape the state of the world for the next ten years.

In a debriefing session and post-exercise interviews, the participants considered the scenario convincing but also reported that the strategic options were overly

narrow in scope. We figured that the better inclusion of social-political complexities in future scenarios would be useful. We managed to create a learning space filled with friendly, well-articulated discussion but lacking in very deep dialogue. However, the participants gave quite positive feedback on having the opportunity to consider a plausible path created by their decisions and saw the benefit of doing such long-term path assessments regularly.

1.4 Thesis outline

The thesis consists of four journal articles and a summary chapter. The structure of the summary is as follows. In Chapter 2, I present the theoretical grounding of the thesis. Central concepts, such as crises, preparedness, preparedness imagination and simulation exercises, are described. Then, in Chapter 3, I first describe the Finnish preparedness regime, including the Finnish comprehensive security model, followed by a discussion of the methodology used in the study. Research ethics are also covered. In Chapter 4, I present the results of the study: the tensions discovered with respect to the preparedness imagination of authorities and solutions for broadening the scope of their preparedness imagination. Finally, Chapter 5 assesses the results and limitations of the study and Chapter 6 offers some concluding remarks.

2 Theoretical grounding

Speaking of a crisis is in an odd way deeply optimistic...the situation may look bad, but it is not hopeless. (Boin et al., 2018, p. 24)

In this chapter, I position my research in relation to earlier disaster and crisis studies. I introduce the central concepts of the study: *crises*, *preparedness* and *preparedness imagination*. The chapter sheds light on the object of interest in this thesis, making it more understandable for the reader: preparedness imagination concerning socio-ecological crises. I also review literature on simulation exercises, which can be considered an essential element of crisis preparedness.

2.1 The study of crises and disasters

A plethora of journals covering disaster and crisis research have emerged in recent years (e.g. *International Journal of Mass Emergencies and Disasters*; *Journal of Contingencies and Crisis Management*; *Risk, Hazards and Crisis in Public Policy*; *Disasters*), and the number of crisis- and disaster-related articles has multiplied in recent decades as well (Kuipers & Welsh, 2017). Additionally, crises and disasters as research topics have become more common in ‘the main generic public administration journals’ over the past two decades (Wolbers et al., 2021, p. 374). The COVID-19 pandemic has further increased the relevance of scientific research on crisis management (Wolbers et al., 2021).

Different expressions for severe disruptions, such as crises, disasters and hazards are often used interchangeably outside academic discussion. However, among scholars, the concepts have more specific meanings. Their use reflects slightly varying research communities, interests and theoretical backgrounds. First, scholars have long contributed to a field of study known as *disaster research*: social scientific, especially sociological, study of disasters became established particularly in the United States in the 1950s and 1960s (Meriläinen et al., 2020; Perry, 2018). The study of disasters is strongly connected with disaster risk reduction policy. Disaster research has been influenced by the United Nations Office for Disaster Risk Reduction (UNDRR) frameworks, but the research has also helped shape them (Meriläinen et al., 2020). One of the contributions made by disaster researchers has

been to contextualise disasters and pay attention to the inequitable distribution of disaster risk among members of different communities (e.g. Barrios, 2017).

Second, *natural hazard researchers* draw from geophysical disciplines to study natural disasters that occur when a hazard agent intersects with a human system. This approach is linked to human ecology (Perry, 2018). Third, some scholars propose a complementary approach to disaster research called *the crisis approach* (Boin et al., 2018). According to Boin et al. (2018), crisis researchers often focus on the phase where intervention can still limit an incident's effects, and they emphasise that 'preparation can make the difference between a small incident and a full-blown disaster' (p. 24; see also Kuipers et al., 2019). Thus, they study *crisis management*, or what people, communities, organisations or leaders can do to avert a threat (Boin et al., 2018). The crisis approach builds on various social science traditions, for example organisational theory, such as on Perrow's idea of normal accidents (1999; see Boin et al., 2018), but it also builds on Roe and Schulman's (2008) studies on high reliability management (see also Kuipers & Welsh, 2017). The crisis approach also borrows from, for example, psychology in the study of decision making in stressful situations (Boin et al., 2018).

Furthermore, the various approaches to studying hazards and disasters are strongly related to policy systems in different geographical or political areas, stemming from unique historical, social and institutional contexts. In the United Nations and European Union contexts, the respective policy area is that of *disaster risk reduction*. *Homeland security* and *emergency management* comprise the policy system in the United States. In the Nordic countries and some Baltic countries, the discussion revolves around *societal security*. (See Chapter 3.1; Staupe-Delgado et al., 2022.) The divisions between the approaches are also visible in corresponding scientific journals and higher education programmes, adding even more plurality to the three branches of study described above (see Staupe-Delgado et al., 2022).

Drawing very clear lines between disaster studies, natural hazard studies, crisis studies and other types of studies is not an easy or particularly useful task, but it helps to illustrate some major trends to the reader. My understanding is that disaster researchers (and natural hazard researchers) have traditionally focused on *natural* disasters, such as floods and earthquakes (instead of so-called *man-made* disasters), and therefore, the field had little to contribute when it came to understanding such events as 9/11, anthrax attacks, eco-crises and economic meltdowns, where collective sense-making is an important component of the analysis. Crisis researchers attempted to fill this gap. (See Boin, 2005; Kuipers et al., 2019.) Furthermore, as mentioned above, crisis researchers tend to focus on the temporal phase, where intervention can still make a difference, as opposed to disaster researchers, who are interested in a longer time frame extending from prevention to recovery (Boin et al., 2018; Kuipers et al., 2019). Taking an

etymological perspective helps to further illustrate the differences in the approaches. In ancient Greek, a crisis refers to a *critical point or a moment of decision*. A disaster, on the other hand, refers to *bad alignment of the stars* – an event is destined to happen because of the unfavourable position of the planets, leaving no room for manoeuvre. Therefore, Boin et al. (2018) point out that speaking of crises is oddly optimistic compared to talk of disasters. Thus, one suggestion has been that *disasters are crises gone bad* (Boin, 2005).

In this thesis summary, I consider the object of my interest to be *crises* (see definition further below), and I base my understanding of them primarily on the crisis approach. The approach combines subjective and objective perspectives (see Boin, 2005), as suggested above by the reference to collective sense-making. As a social scientist, I am more attuned to analysing the subjective side, which refers to the socially constructed side of threats. Such analysis can focus attention on, for example, why people perceive some threats as crises and others as not so dangerous. This approach began with the classic cultural and psychological risk studies done by Douglas and Wildavsky (1982). Many crisis researchers, such as Boin et al. (2016), emphasise that crisis management is essentially political in the sense that different actors ‘will seek to impose upon their key audiences competing views about the nature and depth of the problems facing the system’ (p. 7). Yet, I still maintain that certain ontological threat entities do exist, empirical phenomena that have the ‘potential to cause serious damage’ (Boin et al., 2021a, p. 4), like floods or pathogens that cause infectious diseases. Research with the objective perspective analyses a crisis as a ‘developmental process with root causes, an incubation phase, an acute phase, and an aftermath’ (Boin et al., 2020, p. 122), and it investigates, for example, how complex socio-technical systems contribute to crises. Boin et al. (2016) summarise that ‘there is no natural correspondence between objective and subjective threats’ (p. 30).

A crisis means that a group, organisation or community experiences a threat to their core values or life-sustaining systems that must be addressed urgently under conditions of deep uncertainty (Rosenthal et al., 1989; Boin et al., 2016). Thus, a crisis has three components: *threat*, *urgency* and *uncertainty* (Boin et al., 2016). The first component means that a group of people feels that their shared values or some critical life-sustaining systems are under threat. Threats are subject to human interpretation: they are socially constructed. The second component, urgency, means that a crisis is a problem that must be dealt with immediately. Yet, urgency, too, is socially constructed. For example, a sense of urgency is often quite different at the tactical and operational level versus the strategic level. Lastly, crises are situations with a high degree of uncertainty about the nature of the threat and its consequences and possible solutions. This definition allows for a comparison of a wide range of events (Boin et al., 2018), like natural disasters, pandemics, large-scale accidents, economic crashes, environmental threats and organisational

decline (Boin et al., 2016), and thus, this definition offers a solid basis for the operationalisation of the crisis concept in this study.

Researchers have proposed various crisis typologies based on, for example, their origin or where the unfortunate event hits (Boin et al., 2016). For instance, *transboundary crises* are crises that do not respect the political, functional or temporal boundaries of customary (crisis) management. They typically cascade from one societal subsystem to another (see Article I; Ansell et al., 2010; Boin et al., 2016; Quarantelli et al., 2018). Researchers have also categorised different crisis trajectories from an analytical standpoint. For example, 't Hart and Boin developed a typology based on crisis development and termination: fast-burning crisis, cathartic crisis, long-shadow crisis and slow-burning crisis ('t Hart & Boin, 2001). Building on this typology, the *creeping crisis* concept has recently been developed to aid in analysis of the attention that a crisis attracts along its trajectory (see Boin et al., 2020): the attention that a crisis attracts and its actual damage potential might not develop in harmony. For example, fast-burning crises, such as floods or earthquakes, allow for less disagreement on whether a crisis is taking place, while with creeping crises 'a collective perception of threat' might remain unshared (Boin et al., 2020, p. 121). Creeping crises might develop slowly without attracting attention, have tipping-points along their trajectory and persist over time (Article I; Boin et al., 2020).

In this thesis, I use the concept of *chronic socio-ecological crises* (see also Chapter 1.1) to highlight that we have entered a unique historical era of multiple, interconnected, consecutive systemic crises – many of which are the result of unsustainable actions by humans. This approach stems, first, from the socio-ecological systems framework, which emphasises the interdependencies between humans and nature (e.g., Colding & Barthel, 2019), and second, from recent conceptualisations of the polycrisis as an apt description of the interconnected systemic crises of the Anthropocene (see Lähde, 2023; Tooze, 2022a; see Chapter 1.1). I operationalise the notion of chronic socio-ecological crisis by looking at crises that are related to disruptive changes in the Earth system caused by human activity that exceeds safe boundaries at both sub-global and global scales. Examples of such crises are climate change, biodiversity loss and ocean acidification. (E.g. Steffen et al., 2015.) Such global changes can further result in supply chain issues, extreme weather events, the emergence and spreading of new pathogens and pests, geopolitical tensions related to energy transition and so forth (see, e.g. Article II). Many socio-ecological crises are transboundary in scope and often also creeping, but the reference to chronicity makes it possible to emphasise their repetitive nature. Chronic crises essentially mean the lack of an established sense of 'normal' in between different disruptions – the next crisis must be met while people are still recovering from the previous one. This demands continuous strategic planning and

analysis of how urgent decisions affect the long-term capacity of critical systems (e.g. health care) to deal with crises. (See Article I.)

2.2 Preparedness as a part of crisis management

Societal preparedness has evolved from interpretations of previously encountered events and converted into efficient practices for facing the future. (Heino et al., 2022, p. 1)

The thesis examines how public authorities imagine potential threats or possible future harm before considering a response. Therefore, I situate my research within the domain of *preparedness*. Preparedness is based on the idea that ‘a residual risk’ is always still present despite the best efforts of authorities to mitigate them (Staupe-Delgado & Kruke, 2018). I discuss preparedness and mitigation as aspects of the larger crisis or disaster management cycle. However, it is important to acknowledge that the current preparedness imagination of authorities impacts the whole process of crisis management or the disaster cycle: for example, resources are mobilised based on their understanding of just what constitutes the most essential threats. Additionally, I suggest that this study on preparedness imagination contributes to literature on sense-making in crisis situations, or more specifically, on the *detection* of such crises: the sense-making task consists of detecting emerging threats and of making sense of an ongoing crisis (Boin et al., 2016).

Disaster and crisis researchers and practitioners often apply the *disaster risk management cycle*, or linear model of crisis phases, to guide emergency planning and management practices and to frame lines of inquiry. The cycles, or ‘crisis phases’, consist of mitigation (or prevention), preparedness, response and recovery (Bullock et al., 2013; Gill & Ritchie, 2018; Staupe-Delgado & Kruke, 2018). However, current research also emphasises the ‘temporal, spatial and interpersonal overlap’ of crisis phases (Staupe-Delgado & Kruke, 2018, p. 216). Still, some crisis management researchers find it useful to divide crises into three phases: pre-crisis, crisis and post-crisis (e.g. Coombs, 2014). Additionally, other crisis scholars have devised a set of *critical tasks of strategic crisis management* that they employ in their research: sense-making, decision-making and coordinating, meaning-making, accounting and learning (Boin et al., 2016), or, alternatively, coping with uncertainty, providing surge capacity, coordination of response and communication with the public (Ansell et al., 2010; Kuipers et al., 2020). As mentioned earlier, crisis researchers often focus on a temporarily narrower phase of crises, and thus, most of the critical tasks would fit into the response phase of the linear model. However, sense-making can extend to preparedness as well, and learning continues beyond the response phase.

To complicate matters, in Finnish security policy parlance authorities use the term *preparedness* as an umbrella term to refer to crisis management as a whole, whereas they use the term crisis management (*kriisinhallinta*) when discussing matters related to international crisis management operations. According to the central security policy document 'Security Strategy for Society', 'the aim of preparedness is to prevent accidents and disruptions, to prepare for the measures required during a threat of an accident or disruption or during an accident or disruption and plan the recovery process' (Prime Minister's Office, 2017, p. 9). In the present thesis, preparedness is understood as the anticipatory, future-oriented practices, discourses and policies that enhance capacities for managing future crises (see also Chapter 3.1). Next, I review the existing preparedness literature to further elaborate on how scholars discuss the idea of preparedness.

Preparedness is a subset of a larger discipline or practice that lacks a universally accepted name (Staupe-Delgado & Kruke, 2018), as evidenced earlier by the various approaches to studying disasters, hazards and crises. However, what unifies the various scholars studying such events is a shared interest in how to *prepare* for them. According to Staupe-Delgado and Kruke (2018), who have reviewed the existing preparedness literature, preparedness can in its most succinct form be characterised as 'measures that are of an active, continuous and anticipatory nature' (p. 212). By *active*, they mean that preparedness is 'a relatively dynamic process of planning, exercising, simulating and revising in a continuous fashion' (p. 216). Most preparedness scholars also argue that preparedness is a *continuous* cycle of cumulative learning and thus a process, not a product. The idea of continuity as a feature of preparedness comes from the effort of authorities to keep up with the growing disaster risk generated by unsustainable development. Yet in practice, preparedness studies show that preparedness is often considered as a one-off type of implementation. Finally, scholars argue that preparedness measures should be *anticipatory* (predictive and preventative of potential dangers) to whatever extent possible, especially regarding preparedness planning. However, new thinking on risks emphasises the unpredictability of crises and the importance of flexibility (see more below). (Staupe-Delgado & Kruke, 2018.)

Some other features of preparedness – yet not so widely agreed upon – include *social* (aiming to protect and engage the local population), *planned* (including the planning of activities, such as vulnerability, hazard and capacity assessments, training and networking), *non-structural* (active tasks implemented in anticipation of crises in the short term, whereas structural measures are often seen as mitigation efforts) and *enabling* (facilitating an effective response; yet more recent studies stress the importance of preparing for recovery as well) (Staupe-Delgado & Kruke, 2018.) Another definition of preparedness can be formulated as follows: 'the actions and measures of all kinds executed before the event that make it possible to put

tools in place to better guide intervention and recovery' (Hémond & Robert, 2012, p. 406).

As noted above, preparedness encompasses diverse concrete and empirically observable practices and efforts, such as threat analyses and vulnerability assessments, preparedness planning, resource allocation, training and exercising, early-warning systems, evacuation, stocking equipment and establishing governance and coordination structures (Staupe-Delgado & Kruke, 2018). The activities, aside from the more abstract aspects of preparedness described in the existing literature, helped me operationalise preparedness in my research. However, I remained open to what the interviewees and policy documents described as examples of preparing in the specific cases that I studied. In this study, I understand preparedness to consist of anticipatory, future-oriented practices, discourses and policies that aim to augment capacities for managing future crises.

2.3 Sense-making in preparedness

Here, I explore crisis management literature on sense-making and the detection of crises to shed light on how the level of available knowledge about a situation greatly affects how authorities prepare for and respond to crises. Distinguishing between risks and uncertainty is helpful: making sense of future threats is often based on probabilistic calculations when threats are well-known *risks* (risk = likelihood x impact), or, on the other hand, on other means of assessment, such as imagination, when threats are less well-known or *uncertain* (explained more below). In this thesis, I approach imagination as a defining element in how authorities can especially detect and plan for unprecedented crises.

Sense-making, one of the more critical crisis management tasks, has been defined as 'collecting and processing information that will help crisis managers to detect an emerging crisis and understand the significance of what is going on during a crisis' (Boin et al., 2016, p. 15). The literature has assessed both individual and organisational reasons for why crises may come as a surprise – or why authorities have failed to recognise a crisis in a timely fashion. Although the existing literature focuses on making sense of crises in the response phase, it also covers the detection of emerging threats. Both skilful operators or reliability experts and proper organisational measures are needed for sufficient foresight (Boin et al., 2016; Boin et al., 2018). For example, Roe and Schulman (2008) emphasise that high-risk infrastructures can be reliably run by experienced operators. Organisational cultures can be potential sources of both resilience and vulnerability during crises and disasters (Webb, 2018). For example, high-reliability organisations promote a *culture of safety* among their members, and thus, they support resilience (Webb, 2018). Some organisations can, on the other hand, have *cultures of silence* that contribute to vulnerability because conformity is rewarded or risks are not

discussed (Webb, 2018). Organisations might instead put ‘a premium on continuous vigilance and on a collective willingness to act on faint signals, tolerate false alarms and encourage voluntary admissions of failures and near-misses’ (Boin et al., 2018, pp. 30–31).

Crisis management literature on the organisational aspects of crisis detection further points out that organisations are usually narrowly focused on achieving their goals (e.g. providing medical care to those in need or ensuring adherence to environmental laws) and not on avoiding crises. This type of orientation means that organisations are scanning their environment only from the perspective of their specific goals and handling of familiar day-to-day risks. (Boin et al., 2016.) In other words, their ‘information and performance management systems are designed to provide standardised feedback on goal achievement’ (Boin et al., 2016, p. 26). This is especially true for authorities that function as non-emergency organisations, like most of the actors covered by the Finnish comprehensive security model.

Boin et al. (2016) add that in their efforts to become more effective, those Western organisations that seek to detect threats usually do so in a rational-scientific manner. They approach threats using a quantitative risk analysis approach in which risks are calculated and mapped out and practices created to contain them. However, when certain types of known risks are easily detected by the established detection systems, blinders can be created to detect previously unknown and unimagined crises (Boin et al., 2016), resulting in the lack of systematic monitoring of new, ‘emerging developments that carry the potential to develop into urgent threats’ (Boin & Rhinard, 2023, p. 658). Such a strategy can result in a ‘normalisation of risk’ and a false sense of security (the risk is so small that ‘it won’t happen around here’) (Boin et al., 2016, p. 26). However, it is important to acknowledge that relevant information is not only needed on the surrounding, operational environment but also on systemic and organisational vulnerabilities (see Boin & Rhinard, 2023). The existing Finnish comprehensive security model, as described in Chapter 3, encourages authorities to proactively detect and prepare for emerging threats. Yet, the analysis shows that, in practice, sense-making concerning emerging socio-ecological threats, let alone organisational vulnerabilities, is defective (see Chapter 5).

With respect to preparedness, scholars have emphasised that a lack of imagination in organisations can significantly limit their ability to detect a crisis, leading them to underestimate the potential negative consequences of their actions (see Webb, 2018). For example, preparedness plans could be based on best-case scenarios and thus remain in the realm of unrealistic ‘fantasy plans’ (Webb, 2018; see also Clarke, 1999). An often-cited policy document that first raised the topic of imagination in the context of preparedness is the report published by the so-called 9-11 Commission (The National Commission on Terrorist Attacks Upon the United States, 2002). The report suggested that the 9/11 attacks revealed a *failure in*

imagination in government agencies (besides failures in policy, capabilities and management) and recommended that the exercise of imagination should be institutionalised or routinised. While some American governmental agencies had imagined aircrafts being used as weapons, such exercise scenarios had eventually been discarded because they were considered too unrealistic. However, the report did not offer clear solutions for how to implement the recommendation to use one's imagination. The call to use one's imagination has been interpreted mostly as a call to use a wider pool of data in the analysis of threat landscapes, and new analytical tools and procedures have been central in those efforts (Bougen & O'Malley, 2009; Heino et al., 2022). Instead of solving the problem of a lack of imagination by creating, for example, automated technologies for facial recognition or social network analysis (as happened in post-9/11 US security policy; see Bougen & O'Malley, 2009), the 9/11 report's recommendation could stimulate the search for more creative ways to institutionalise imagination within the context of preparedness, such as simulation exercises (see Chapter 2.5).

Thus far, it is clear that the level of available knowledge about a potential situation greatly affects how authorities prepare for and respond to crises. Certain events can be predicted, allowing for some variation, such as floods or hurricanes in certain areas. Preparedness planning can be done somewhat straightforwardly for such events, and quantitative risk analysis of the chances they will occur again in the future can be done if enough data is available. (Boin et al., 2018.) Authorities can then estimate the potential consequences and plan response measures accordingly. However, risk assessments and plans are less useful when disruptions are unique (Boin et al., 2018; see also Ansell & Boin, 2019), or in other words, when operating in the realm of ignorance in which it is impossible to determine both the character and likelihood of different possibilities (Stirling & Gee, 2002). Crisis researchers suggest that currently, new types of risks and new societal systems make possible new types of crises, such as the breakdown of transportation systems due to volcanic ash or broad-based information system failures that affect multiple sectors and countries (Quarantelli et al., 2018; see also Beck, 1992; Boin et al., 2004). For instance, Boin et al. (2004) already two decades ago argued that 'future crises will become increasingly complex in nature, will not respect national, cultural, or temporal boundaries, and will easily intertwine with other issues and developments' (p. 387). Now, twenty years later, it is also clear that the rate of global environmental change is accelerating and causing chronic socio-ecological disruptions (IPBES, 2019; IPCC, 2023), which make the historical templates and strategies for managing socio-ecological challenges increasingly insufficient (Kaaronen et al., 2021).

Crisis management in its traditional form is not fit to adequately deal with the increasingly complex crises (e.g. Ansell et al., 2010; Quarantelli et al., 2018), and thus, scholars suggest that emphasis should be put on resilience rather than

anticipation when preparing (Boin et al., 2004). For example, in their review of recent preparedness studies, Staupe-Delgado and Kruke (2018) note that new thinking about risk places greater emphasis on uncertainty and complexity. Preparing for unpredictability ought to be the norm instead of preparing for the expected and routine. Thus, authorities should acknowledge both the need to anticipate (foresight) and to remain flexible. Therefore, response as well should consist of two parallel processes: implementing planned and trained structures and adapting to and improvising during a specific crisis. (Staupe-Delgado & Kruke, 2018; see also Ansell & Boin, 2019.)

From the social scientific perspective of this study, the future is not just a product of contingency or extrapolating from currently ongoing processes – it is actively shaped by present (preparedness) practices in which a particular future is imagined, narrated, performed and so forth (e.g. Müller-Mahn et al., 2018). Preparedness is based on acting in the present on the grounds of a future (Anderson, 2010). According to Anderson (2010), various means of understanding alternative futures in the present are used while preparing for a crisis: probabilistic *calculation*, which results in futures presented through numbers that are often visualised in tables, charts and graphs; (creative) *imagination*, in which future events are imagined *as if* they were real (going beyond what is *probable* into the realm of what is *possible*) in practices such as scenario planning and backcasting, and utilising visualisation (images, symbols, metaphors) and narrativisation (stories); and *performance*, evident in, for example, simulation exercises through gaming and acting (resulting in an ‘anticipatory experience’ for the participants, or ‘as if’ embodied action) (Anderson, 2010; see also Staupe-Delgado & Kruke, 2018). It is the latter two – imagination and performance – that should complement probabilistic calculation to improve preparedness for ‘the inconceivable’ (Staupe-Delgado & Kruke, 2018, p. 218).

2.4 Preparedness imagination

Though imagination is sometimes used to enable us to escape or look beyond the world as it is, as when we daydream or fantasize or pretend, it is also sometimes used to enable us to learn about the world as it is, as when we plan or make decisions or make predictions about the future. (Kind & Kung, 2016)

In this subchapter, I suggest that analysis of the preparedness imagination of the current preparedness regime reveals where the possibilities lie for detecting emerging socio-ecological threats. First, I begin by discussing the study of collective imagination and then introduce the concept of preparedness imagination.

Scholars in different fields have studied imagination, meaning no comprehensive and systematic characterisation of it exists within the academic

literature. Some fields, such as psychology and cognitive sciences, approach imagination as an individual's cognitive activity, which involves forming a quasi-sensory mental representation of a person, item or event (see Spaulding, 2016). However, rather than analysing professional mindset at the individual level, in this thesis I focus on collective aspects of imagination – imagination as a social practice. For such analyses, some social scientists, particularly science and technology scholars, have employed concepts like socio-technical imaginary or climate imaginary (e.g. Davoudi & Machen, 2022; Jasanoff & Kim, 2015; Taylor, 2003). Studies on imaginaries usually focus on widely shared and durable visions of futures that are co-produced by technology, science and society (see Davoudi & Machen, 2022; Jasanoff & Kim, 2015). Even though the preparedness regime itself appears to be durable, I maintain that what I analyse here is institutionally and technologically less stable and not widely shared in society. I focus instead on authorities' threat scenarios and their efforts to make sense of impending crises. Therefore, the analysis benefits more from the concepts of *preparedness imagination* and *epistemic governance*, which are introduced next.

In this thesis, I employ the concept of preparedness imagination as proposed by Heino et al. (2022), using it to analyse Finnish preparedness for potential socio-ecological crises. Preparedness imagination can be defined as the 'ability to explore ideas of threats that are not apparent in an operational environment' (Heino et al., 2022, p. 2). A more specific focus on the *State's* preparedness imagination further illustrates that preparedness imagination can be approached as the 'systematic mechanism by which various threats are thought to be addressed through the mobilisation of capacities within a society', including 'exercising powers, pooling resources, coordinating activities, and focusing attention on the most essential threats in order to prevent and address them in an effective way' (p. 2). However, the analysis presented in the present thesis does not focus solely on the central administrative level. Studying the preparedness imagination of authorities can aid in understanding the very vulnerabilities that preparedness actions themselves can generate (Heino et al., 2022). One important aspect to consider is the extent to which the preparedness regime is oriented towards previously unknown threats (Heino et al., 2022). Here, by analysing preparedness imagination, I make second-order observations of how preparing takes place, thus shedding light on how the current way of preparing for socio-ecological crises can be a source of vulnerability.

In their research on preparedness imagination, Heino et al. (2022) have drawn from previous work on epistemic governance (O. Heino and M. Heikkilä, personal communication, 16.3.2023). According to Alasuutari and Qadir (2014), epistemic governance is a framework for analysing policy-making processes. Here, I use the framework to operationalise preparedness imagination in my research. The framework holds that governance works in the following manner: actors influence other actors' beliefs and views 1) about the ways in which the world is organised, 2)

the roles and identifications of actors in that world and 3) the nature of valued goals regarding social change. In other words, epistemic work (e.g. when making policy proposals) always involves (often unconscious) assumptions or propositions about three aspects of the social world: ‘what is the environment, who are the actors, and what is virtuous or acceptable’ (Alasuutari & Qadir, 2014, p. 72; see also, e.g. Alasuutari et al., 2019; Paananen et al., 2020). My understanding is that such epistemic work is also performed when authorities formulate how to prepare for threats, as preparedness is essentially about efforts that aim to alter the future state of society. Analysing the preparedness imagination of authorities is a way to reveal some of the epistemic conditions that shape how they detect emerging threats and address them. My analysis shows, for example, which actors are presumably the most appropriate actors on matters of comprehensive security and what kinds of assumptions do authorities who are part of the preparedness regime make about the nature of potential crises.

Previous analyses of preparedness imagination focus on the state level, where ‘much of the preparedness thinking of societies is facilitated’, and approach the topic through a review of central, state-level preparedness documents (Heino et al., 2022, p. 2). However, in this thesis I assume that authorities’ understanding of threats and how they interpret and implement national-level security models/documents is a friction-laden process scattered across multiple levels and sectors of society (see Chapter 3.1; Article II). While I agree that states are important objects of security and preparedness analysis, in this thesis I also use interview and observational data on policymakers and experts who are working on unconventional security issues at different administrative levels. This offers me an opportunity to present a fine-grained image of how the preparedness regime views socio-ecological crises with respect to its current preparedness imagination.

Based on document analysis, the Finnish preparedness imagination can be described as ‘modernist machinery’ that efficiently reduces complexities, unpredictability and uncertainty related to threats and assumes that they can be controlled (Heino et al., 2022, p. 9). The threats are always thought to come from *outside* the preparedness apparatus itself. Deviations from established structures, plans or responsibilities are considered failures. The threats do not compromise the ability of the apparatus to cope with them, and the threats are ‘systematically disconnected from each other’ (p. 4; see also p. 6), resulting in a fragmented view of threats. Despite stating that threats can cross sectoral lines, the preparedness documents are premised on the assumption that it is always easy to identify the primary ‘owner’ of the threat (Heino et al., 2022).

The current State’s preparedness imagination ‘expresses no concerns for what remains beyond its comprehension’ (Heino et al., 2022, p. 1), and authorities strongly believe that they can identify the most serious existential threat to the state: war. The national risk assessment (Ministry of the Interior, 2019) employs a

calculative approach that is based on the concept of risk (=probability x potential impact) and thus efficiently presents the environment as predictable (Heino et al., 2022). The standardisation measure (all threats can be compared on the same scale) offered by the risk approach ignores ‘subtle, systemically emerging effects that would erode the fundamental structures of a society’ (Heino et al., 2022, p. 6; see also Sissonen, 2023). In effect, the risk assessment process involves calculating just what threats deserve *further imagination*. The calculations are meant to reveal the most relevant and worst version of each threat model, while actually presenting ‘a bad but manageable’ one (Heino et al., 2022, p. 9). Heino et al. (2022) have concluded that such a ‘preparedness imagination is efficient in managing threats as they are identified, and in generating reassuring perceptions of security, but that it is prone to a vulnerability that develops beyond the reach of the imagination and is attached to its strengths’ (p. 1). In other words, by developing increasingly optimal responses to known threats, the preparedness apparatus loses its ability to identify previously unknown threats. This rather bleak picture about the current state of the Finnish preparedness imagination inspired me to explore the issue further with a more extensive set of data (especially in Article I; Article II).

2.5 Simulation exercises

In this thesis, I explore a certain kind of simulation exercise (the POR) as one way of institutionalising the use of imagination and thus expanding the current preparedness imagination of authorities. I maintain that such exercises can be used to feed feelings of uncertainty (Heino et al., 2022) and that they should be designed so that the participants have to tame unplanned, wicked problems (Edzén, 2014).

Earlier research shows that simulation exercises have become an established part of preparing, and they have been widely studied by crisis and disaster researchers (e.g. Andersson et al., 2014; Berlin & Carlström, 2015; Perry, 2004). Exercises can nurture a preoccupation with possible failure (Boin et al., 2004). They can be used for ‘exploring the feasibility of future policy alternatives, for studying and motivating organisational change, and as research tools to study the processes or organisational change, policy-making and stakeholder interaction’ (Johansson et al., 2018, p. 916), making them promising tools for expanding preparedness imagination of authorities. Organisational change is the key here: merely developing or updating a preparedness plan should not be the end point of preparing for a crisis. Instead, exercising and testing the plan can help to challenge processes that allow crises to develop. The aim should be to expose the pathways of vulnerability that exist within an organisation, such as a lack of improvisation skills. Thus, exercises can serve as a useful auditing mechanism for organisations. However, some researchers warn that managers are often reluctant to consider

worst-case scenarios and the types of organisational practices that might lead to them. (Smith, 2004.)

Simulation exercise studies and manuals typically identify two categories of exercises: discussion-based (e.g. table-top exercises and games) and operation-based exercises (e.g. functional or full-scale exercises) (see Grunnan & Fridheim, 2017; UNDRR, 2017). For example, in addition to operation-based drills that test emergency procedures and response skills, various types of serious games, like policy exercises, are used in public policymaking to analyse complex policy problems, like energy reform or spatial planning. The exercises can represent both technical-physical and social-political complexities (see Mayer, 2009), and therefore, they allow the players to explore the interaction between physical and social systems in a strategic multi-actor setting.

The effectiveness of learning through simulation exercises has been widely studied (e.g. den Haan & van der Voort, 2018; Borodzicz & Van Haperen, 2002; Moats et al., 2008). Exercises offer a low-risk learning environment without real-life consequences (Mayer, 2009; Solinska-Nowak et al., 2018). They allow for experiential learning, where skills are gained and applied in relevant settings via active involvement (Rijumol et al., 2010), as well as social learning, where a change in understanding is ‘achieved through interaction in collaborative and participatory settings’ (den Haan & van der Voort, 2018, p. 1). Scholars have, though, expressed some reservations about the benefits of using such exercises, with many acknowledging that this topic should be studied more (e.g. Beerens & Tehler, 2016, p. 420). For example, exercises never match real events, and learning from them is in this sense always limited (Andersson et al., 2014; Boin et al., 2004).

Most of the simulation exercises reported in the research literature focus on the reactive management of an abrupt crisis. Their scenarios feature short-term disruptions, such as floods (Solinska-Nowak et al., 2018), large-scale accidents (Berlin & Carlström, 2015) or earthquakes (Peleg et al., 2018). On the other hand, most policy exercises address sustainable resource management or climate policy without including a sudden crisis as an element, for example by simulating land-use decision-making processes (e.g. Flood et al., 2018; Wesselow & Stoll-Kleemann, 2018). It seems that scenario-based exercises that would systematically allow participants to follow through on a series of urgent decisions and their long-term path-dependencies are rare – especially such exercises where decisions are not only made during one-off crises, but in more chronic, wicked situations. (Article IV.)

Many researchers have been calling for exercises that would include more complex, transboundary and surprising crises (e.g. Boin et al., 2004; Edzén, 2014; Gomes et al., 2014; Quarantelli et al., 2018). Most scenarios are fixed or predetermined, they escalate despite the participants’ actions (Boin et al., 2004; Gomes et al., 2014), and they do not allow for adaptive behaviour and out-of-the-box thinking because the exercise often includes a specific template for expected

behaviour (Noori et al., 2017). Edzén (2014) suggests that table-top exercises should focus on unsolved, wicked problems that allow participants to identify and tame the problems instead of letting them be tamed in advance by the exercise developers. Boin et al. (2004) suggest that exercises should also feature long-term and institutional crises, such as situations where the participants' institution loses its legitimacy (see Article IV).

3 Material and methods

In this chapter, I contextualise the empirical material by providing an overview of Finland's preparedness and security policy. Then, I describe the case study research design of this qualitative thesis, and I summarise the chosen methods of data collection and analysis for the individual articles. Finally, I discuss research ethics.

3.1 Finnish preparedness regime

The Finnish authorities and policy documents use the concept of preparedness as an umbrella term to refer to the whole crisis management cycle: the prevention of disruptions and accidents, preparing a response and planning a recovery (see Prime Minister's Office, 2017). They define preparedness as 'activities ensuring that all tasks can continue with minimum interruptions and that the required exceptional measures can be performed during disruptions occurring in normal conditions and during emergencies' (Prime Minister's Office, 2017, p. 9). It includes such measures as 'contingency planning, continuity management, advance preparations, training and preparedness exercises' (Prime Minister's Office, 2017, p. 9). In this thesis, I use the concept of *preparedness regime* to refer to the established crisis preparedness governance system with its wide range of actors and actions, which are further described in this subchapter. A regime is a social institution governing the actions of those interested in specifiable activities, and it is a recognised pattern of behaviour or practice around which expectations converge (Young, 1982).

In Finland, civil society preparedness against a variety of disruptions is based on the comprehensive security model, as described in the Security Strategy for Society (see Prime Minister's Office, 2017). The model aims to safeguard the vital functions of society (see below) based on broad cooperation among authorities, business operators and communities. The model is based on statutory tasks and the responsibilities of competent authorities. (Prime Minister's Office, 2017; see also Article I; Article II.) The broad understanding of security as *societal security* (see below) explains the close connection between crisis management and security policy in the country. Differing from other Nordic countries, no separate institution coordinates crisis/disaster governance in Finland (Meriläinen et al., 2020), meaning that governance follows the principle of self-sufficiency: the responsibilities and roles of authorities are the same in both normal and exceptional

conditions (Pilli-Sihvola et al., 2018). However, the Department of Rescue Services, part of the Ministry of the Interior, is the closest equivalent to a separate institution that has a coordinating role in civil crisis/disaster governance (Meriläinen et al., 2020). Climate change adaptation – which is mainly a distinct policy area despite often having overlapping interests with the governance of so-called natural disasters – is coordinated by the Ministry of Agriculture and Forestry (Pilli-Sihvola et al., 2018).

Some measures to integrate preparedness and climate change adaptation have been taken: The national climate change adaptation plan aims to better integrate climate risks into comprehensive security policy (Ministry of Agriculture and Forestry of Finland, 2023), while the Security Strategy for Society is concerned with environmental emergency response, the detection of environmental changes, and flood risk management (Prime Minister's Office, 2017). The 2013 Electricity Market Act has been amended to better respond to regional weather challenges, limiting the length of electricity blackouts. Since 2012, a multi-sectoral early warning system (LUOVA) has disseminated natural hazard information to national-level officials and different security authorities. Additionally, the Flood Center forecasts and warns authorities, private actors and citizens about floods. (Pilli-Sihvola et al., 2018.) However, as seen in Article II – which investigated a broad range of actors, including climate change and environmental specialists – the current level of integration is not sufficient to properly cover the long-term, cross-sectoral and cascading character of environmental issues.

All Finnish public authorities are legally obligated to prepare for performing their operations in all types of conditions (Prime Minister's Office, 2017). Thus, preparedness efforts are made by a multitude of public officers and decision-makers at all levels of governance and across different sectors in Finland. Due to the decentralised organisation of crisis governance, which follows the principles of self-sufficiency and locality (management happens at the lowest level possible) (Meriläinen et al., 2020; Pilli-Sihvola et al., 2018), it is necessary to examine a broader set of actors beyond just top leadership and beyond any single institution in this thesis. Strategic crisis management tasks are not only reserved for executive leaders; they are often performed by a broader network of people holding public offices. Both operational and strategic actors were interviewed and observed during this study.

The vital functions that the comprehensive security model aims to safeguard are as follows: leadership; international and EU activities; defence capability; internal security; economy, infrastructure and security of supply; functional capacity of the population and services; and psychological resilience (Prime Minister's Office, 2017). In the Nordic countries, vital functions are understood to include not only critical physical infrastructure but also broader societal systems, such as a functioning economy and income security (Meriläinen et al., 2020).

The Finnish notion of comprehensive security is closely related to the concept of *societal security* used in Nordic welfare countries like Sweden, Norway and Denmark (Meriläinen et al., 2020; Larsson & Rhinard, 2020; for more on Nordic functionalist security studies on the origin of the idea of societal security, see also Larsson & Rhinard, 2020). In Finland, the comprehensive approach to security grew out of the need to organise the welfare system in close cooperation with national defence during the Cold War (Larsson & Rhinard, 2020), but its deeper roots can be traced to the first decades of Finland's independence in 1917 and experiences of the two world wars (see Valtonen & Branders, 2020). The current broadened security approach still owes much to defence thinking and war preparedness efforts (Hyvönen and Juntunen, 2020). The Finnish comprehensive security model emphasises effective coordination across and between different levels of governance, and it has been based on the rule of law and stresses the need for preparing. The model has been developed in a phenomenon-based manner, meaning that collaborative efforts have emerged out of practical needs rather than based on administrative decisions. (Valtonen & Branders, 2020.)

Finnish authorities have a long tradition of cooperation, which facilitates the polycentric governance structure (Pilli-Sihvola et al., 2018). The government directs and coordinates the safeguarding of the vital functions, while a cross-sectoral Security Committee assists the government in coordinating preparedness efforts and each competent ministry directs and coordinates preparedness in its own administrative branch (Prime Minister's Office, 2017; Article II). The Security Committee, under the Ministry of Defence, comprises 19 members and 5 experts from different administrative branches, authorities and the business community (Security Committee, 2023), who are, nevertheless, chosen in an exclusionary manner (see Branders, 2016). During disruptions, the competent ministry takes charge of activities and coordinates actions between the different ministries, while the prime minister coordinates activities within the government's purview (Prime Minister's Office, 2017). However, the prime minister's role as the official in charge of the government is 'highlighted during incidents and in preparedness work, in which coordination and action based on correctly timed information are essential' (Prime Minister's Office, 2017, p. 16).

The Finnish comprehensive model aims to support proactive preparedness based on foresight (Valtonen & Branders, 2020). As such, the starting point for the comprehensive security model is to provide a way for identifying new kinds of security threats (Article II). Public authorities oversee several national, regional and local-level foresight networks (Pouru et al., 2020). For example, the Security Committee produces a yearly foresight report for state leaders based on networks of experts (Prime Minister's Office, 2017; Valtonen & Branders, 2020). However, at the national level foresight efforts focus more on evaluating probable futures and

are often based on sectoral information, while an analysis of surprises or alternative futures and systemic evaluations is rarer (see Pouru et al., 2020).

A national risk assessment is compiled every three years in accordance with Decision No 1313/2013/EU of the European Parliament and of the Council on a Union Civil Protection Mechanism (see Ministry of the Interior, 2016, 2019). Regional risk assessments are also compiled in Finland (Meriläinen et al., 2020). According to Valtonen and Branders (2020; cf. Heino et al., 2022), since the 1990s authorities have focused on unintentional threats in addition to the worst-case scenario of war in preparedness planning, and a turn towards securing vital societal functions has been taken. The model aims to support authorities' preparedness to manage *complex* threats in a *complex* operating environment (Valtonen & Branders, 2020). Valtonen and Branders (2020) and Meriläinen et al. (2020) have suggested that the newest security policy documents exhibit an all-hazard approach (a focus on the potential *consequences* of threats instead of the details of such threats). The national risk assessment considers whether a threat would have direct or indirect impacts (Ministry of the Interior, 2019), and the Security Strategy for Society acknowledges the potentially complex interrelations between different threats by stating that they might appear 'on their own, simultaneously or as continuums' (Prime Minister's Office, 2017, p. 25). Yet in practice, the national risk assessment describes each threat scenario in a fragmented manner, as 'individual problems' (Heino et al., 2022, p. 6). Regarding the environment, the Security Strategy for Society explicitly considers an environmental emergency response, the detection of environmental changes and flood risk management (Prime Minister's Office, 2017), and the newest national risk assessment describes climate change as a condition that is currently altering the security environment (Ministry of the Interior, 2019). Yet, policy analysis has shown that authorities lack a comprehensive approach that would make it possible to recognise *environmental* security impacts on multiple sectors and at multiple levels (Hakala, 2019a), as also shown in our study based on the interview material (Article II).

3.2 Methods of data collection and analysis

In this thesis, I investigate the Finnish preparedness regime's preparedness imagination concerning socio-ecological crises. To explore the factors preventing authorities' current preparedness imagination from recognising socio-ecological crises in Finland (RQ1), I delved into the empirical cases of pandemic preparedness (Article I) and the Finnish comprehensive security model and environmental threats (Article II). Also, the POR exercise organised in Helsinki (Article IV) provided me with valuable insights on the epistemic work of the municipal actors. Articles III and IV present a specific kind of simulation exercise, the POR, and they helped me explore especially the second research question on how the scope of

authorities' preparedness imagination could be adjusted to better address chronic socio-ecological crises. Yet, several ideas for such an adjustment also derive from the empirical cases presented in Article I and Article II.

The research design of this thesis builds on a case study approach. A case study is best described as 'an empirical method that investigates a contemporary phenomenon (the "case") within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident' (Yin, 2017, p. 15). The case study focusing on authorities' preparedness imagination for managing potential socio-ecological threats covers multiple cases and then draws 'cross-case' conclusions (see Yin, 2017). I selected specific cases that allowed me to analyse future-oriented preparedness practices, discourses and policies in different sectors and at different levels of governance and also both in policy planning and implementation. The rationale for choosing the cases for the thesis is to reveal 'a common case' (Yin, 2017, p. 50) of preparedness for managing socio-ecological crises: preparedness is a somewhat dull, routinised set of operations that all Finnish authorities perform, and together the chosen cases paint a more holistic picture of authorities' epistemic work (see Chapter 2.4) with respect to managing socio-ecological crises. Convergent evidence was sought from each individual case to support the overall findings and conclusions for the study, and then the conclusions drawn from each case were regarded as information that needs to be compared with the other cases (see Yin, 2017). However, the limited number of cases and small dataset is a weakness that must be accounted for when making analytical generalisations based on the material (see more in Chapter 5.2).

I argue that the chosen empirical material (see below) for studying authorities' preparedness imagination is fruitful because their 'narratives, perceptions and interpretations' of disruptions 'work performatively': their shared understandings and perceptions facilitate 'certain options and actions while constraining others', and therefore, they 'have effects on the material, political and social worlds' (Lidskog, 2018, pp. 2–3). In this study, the emphasis on the performative aspect of authorities' preparedness imagination is an analytical approach that treats the act of preparing for threats as a world-making process (see, e.g. Alvial-Palavicino, 2015). Preparedness is essentially about efforts that aim to alter the future state of society.

The pandemic case (Article I) presents an in-depth analysis of national-level preparedness for managing one specific socio-ecological crisis. Due to its comparative approach (before and during COVID-19), the case contains reflections on how authorities implemented existing policies when the threat scenario materialised and how pandemic preparedness changed over time. I had finished a study on pandemic preparedness one year before COVID-19 (representing a common case), and once COVID-19 started it offered me a chance to approach pandemic preparedness as a longitudinal case. As such, the pandemic case has

revelatory potential (see Yin, 2017), as it represents a situation where a researcher has had the unique opportunity to analyse a setting that is not easily accessible. At the same time, the pandemic can be considered a critical case with strategic importance (Flyvbjerg, 2006): it was reportedly one of the most extensive and multi-sectoral scenarios in the country. Before the COVID-19 pandemic, Finland was rated the tenth best country in the world in preparing for epidemics and pandemics (Nuclear Threat Initiative, 2019). Thus, it is a revealing case about the capabilities of the Finnish preparedness regime.

In turn, the case of comprehensive security and environmental threats (Article II) is based on extensive interview material from different sectors and administrative levels (see Article II: Supplementary File), offering a multi-sectoral and multi-level view on the implementation of preparedness policies in the country – especially in relation to unconventional, ‘soft’ security issues, like socio-ecological threats. It includes a focus on climate change mitigation and adaptation experts as well as other professionals. The article juxtaposes the central policy document with the interview material, analysing how authorities implement the comprehensive security and acknowledge environmental change. Finally, the case of POR in Helsinki (Article IV) provides a detailed analysis of municipal decision-making in a socio-ecological crisis simulation exercise. The preliminary results from the other POR exercises (Article III) provide more data on the POR case.

Table 1 The materials used in individual articles

Article	Type of data
I. Imagining the next pandemic: Finnish preparedness for chronic transboundary crises before and during COVID-19	Participant observation (7 months); interviews (24 interviews with 14 experts); policy documents (4)
II. Comprehensive Security: The Opportunities and Challenges of Incorporating Environmental Threats in Security Policy	Interviews (40 interviews with 44 experts); one document (1)
III. The policy operations room: Analyzing path-dependent decision-making in wicked socio-ecological disruptions	Conceptual paper based on literature reviews; preliminary data from three types of PORs (interviews, observation)
IV. A simulation exercise for incorporating long-term path dependencies in urgent decision-making	Observation; interviews; journal articles and white papers on simulation exercises

This qualitative thesis is based on (participant) observation, interviews, document analysis and a literature review. Table 1 shows the diverse types of data used, allowing for triangulation, which helped increase the validity of the research. For example, Article I employs the triangulation technique as a way of assessing the

semi-structured interviews in relation to the validity of the field observations and the reading of preparedness documents. Also, the investigator triangulation used in Articles II, III and IV increases the credibility of the findings. In general, the dataset consists of collective professional preparedness practices (as described by the experts and observed by me) and written products, such as preparedness plans and threat assessments. The documents can be considered 'written handprints of preparedness imagination' (Heino et al., 2022, p. 3). Next, I describe the data gathering processes and then the data analysis processes.

The data gathering process for Article I was done in two phases. The first phase consisted of analysing the material that I had collected for my master's thesis on pandemic preparedness in 2017–2018 (see Räsänen, 2018). In 2017, I engaged in seven months of participant observation in the Finnish Institute for Health and Welfare's (THL) Infectious Disease Control Unit, part of the Department of Health Security. I was employed to conduct a preparedness-related project during this period, which helped me gain a basic understanding of health preparedness in the country. In 2018, I conducted 14 interviews with nine experts from THL and two experts from the Ministry of Social Affairs and Health (STM). The second dataset for Article I consists of ten interviews, done in 2021, with seven experts from THL and one expert from STM. I approached the same experts that I had interviewed for my master's thesis. Due to changes in staff and time constraints, three new experts were included while five experts from the previous dataset re-participated in the study. I used the same semi-structured interview guide in 2021. Additionally, I analysed the following security and preparedness policy documents: the National Preparedness Plan for an Influenza Pandemic (Ministry of Social Affairs and Health, 2012), the Security Strategy for Society (Prime Minister's Office, 2017) and the National Risk Assessment (Ministry of the Interior, 2016, 2019). The interviewees also shared various reports and documents with me, which helped me to gain a deeper understanding of preparedness.

The THL and STM experts chosen for the interviews were responsible for managing and/or preparing for epidemics and pandemics in their institutions. The experts have devised preparedness plans and guidelines for various biological threat situations and taken part in vaccine research and the development of national disease surveillance systems, among other things. During the COVID-19 pandemic, all the interviewed experts took part in managing the pandemic. Their tasks included compiling and sharing epidemiological situation pictures with international and national actors, conducting international epidemic investigations, providing expert advice on health security for different sectors and developing the national SARS-CoV-2 laboratory diagnostic capacity. (Article I.)

The illustrative case of comprehensive security and environmental threats discussed in Article II is based on a large corpus of interview material collected by researchers as part of the WISE project (see Acknowledgements). The interviews

were conducted prior to my involvement in the project, and thus I did not personally conduct them. The same interview material was utilised to develop the POR concept, especially when designing the Path-POR scenario in Article IV. The interviewees (n = 44) were selected to represent the diversity of Finland's resilience and adaptation infrastructure against disruptions. They included experts and officials from various sectors, such as public authorities from different administrative branches, researchers from different disciplines and representatives of private companies, including climate and environmental experts. Among the authors of Article II, we reasoned that the interview material would make it possible to analyse a range of security concerns beyond just the traditional security field. Our analysis focused on environmental threats in the experts' own field and measures taken to counter them. Analyses of environmental security are often based on document analysis, whereas we suggested that such detailed interview material is essential for a more nuanced understanding of the challenges and opportunities of incorporating environmental issues in security and preparedness policy.

In reality, the data gathering and data analysis phases occurred simultaneously as part of the qualitative approach, which added to the depth and quality of the data analysis (Vaismoradi et al., 2013). All the above-described interview material was recorded and transcribed verbatim, and content analysis was employed as a research method. Further details on the different phases of analysis, with examples of the coding process, can be found in the original articles. The coding process, with Atlas.ti, was done in a data-driven manner in Article I, whereas the coding was done in a more theory-driven manner in Article II. In Article I, the material was further organised into two groups to allow for a comparative reading: pre-COVID-19 and COVID-19 groups. Finally, in Article I the themed data was interpreted using the analytical framework of transboundary crises, characterised by three dimensions (political, functional and temporal) (Ansell et al., 2010), to help investigate the experts' changing understanding of the pandemic threat. In Article II, in close collaboration with Emma Hakala, we built a coding system consisting of three-level environmental security impacts based on suggestions made in prior studies and finalised the analysis with an interpretive phase, where we thematised the material to identify recurring challenges that authorities face when implementing the comprehensive security model.

The POR exercise – presented in Articles III and IV – is a key research and interaction instrument developed as part of the WISE project. Article III is a conceptual paper, and thus only preliminary insights were presented based on observations made of the different types of PORs and on interviews with the participants. Subsequent analysis and development of the POR concept is ongoing (see <https://www.helsinki.fi/en/projects/longrisk/info>). In general, simulation exercises can be thought of as methodological tools in their own right: they synthesise a complex system and make it possible to observe the participants'

behaviour and decision-making processes (Vieira Pak & Castillo Brieva, 2010). Thus, simulation exercises have a dual purpose because they benefit the participants, who can practise their skills, while at the same time they can yield new scientific knowledge (and thus, we collected data during the exercises) (e.g. Wesselow & Stoll-Kleemann, 2018). Exercises can be used for ‘exploring the feasibility of future policy alternatives, for studying and motivating organizational change, and as research tools to study the processes or organizational change, policy-making and stakeholder interaction’ (Johansson et al., 2018, p. 916). Most importantly, simulation exercises proved the only method that allowed us to devise a situation where policymakers must live with the consequences of their decisions for many decades. The POR design is better described in Chapter 4.2.

To best conceptualise the POR in Article III and find guiding principles for the detailed design of the POR in Article IV, I conducted an extensive literature and white paper review of simulation exercises. The review included an assessment of approximately 80 journal articles and five white papers, such as simulation exercise manuals prepared by WHO and the European Centre for Disease Prevention and Control (ECDC). The review synthesised evidence and did not just systematically explore the existing literature. The review provided guidelines for incorporating vital components into the exercise and to establish a set of criteria for evaluating the success of the exercise in providing a learning platform for the participants. Since both articles had a broader objective than merely analysing the existing simulation exercise literature, the literature review process itself was not described in detail.

To evaluate the success of the POR exercise design in Article IV, the exercise was audio-recorded and observed by six researchers, including myself. The same data will be used to analyse the decision-making processes of authorities in future papers by WISE researchers. We also interviewed eight out of 14 exercise participants and all three co-organisers from the city after the exercise. The interviewees were asked to describe their professional backgrounds, their past experiences with comparable exercises, the match between their expectations of the POR and how the POR worked in practice, similarities and differences between the POR and a real-life crisis situation, expert–policymaker interactions in the POR and what they had learned in the POR.

3.3 Research ethics

Protecting the personal information of informants/interviewees was a priority at all times. However, in Article I total anonymity was impossible to guarantee since the number of experts from the studied organisations was quite limited. Article IV faced the same issue but with respect to the small number of decision-makers and experts. Throughout the research process, we were open with the participants about

the challenges related to anonymisation. They were also informed about the data management practices. Final reporting was always done in such a form that individual experts could not be identified. Permission for the fieldwork done at THL was obtained from the head of the unit, and I informed the experts about the data gathering process both verbally and in writing at the beginning of and during the fieldwork process.

All data collected, stored, used and managed as part of the WISE project complies with the University of Helsinki research data policy and data management guidelines (<http://hdl.handle.net/10138/338781>). Some information and documents concerning civil defence and preparations for accidents and emergency conditions are classified as secret in Finnish legislation (Act 621/1999). Such confidential material has only been used as background information during this research process, but it is never cited directly nor analysed per se.

4 Results

In this chapter, I answer the research questions posed at the start of the thesis summary based on the findings from the original articles. In the introduction, I presented the following research questions: 1) What factors prevent the current preparedness imagination of authorities from recognising socio-ecological crises in Finland? 2) How can the scope of their preparedness imagination be adjusted to better address chronic socio-ecological crises? To answer the first question, I present a set of tensions that I identified in the preparedness imagination of authorities while analysing the cases of the Finnish comprehensive security model and Finnish pandemic preparedness plans and taking part in designing, organising and observing the PORs. The tensions shape the epistemic conditions in which threats can be detected. Then, to answer the second question, I explore some ways to resolve the identified tensions as a means of broadening the scope of authorities' preparedness imagination.

4.1 Tensions in authorities' preparedness imagination

Table 2 Interrelated tensions that constrain authorities' preparedness imagination

Tension	Article
imagined crises vs 'real' crises	I, II, III, IV
short-term vs long-term time horizons	I, II, III, IV
climate change adaptation vs mitigation	II, III, IV
hard vs soft security sectors	I, II
operational/technical vs strategic/political crisis management	I, II, III, IV
exercises to routinise response vs exercises to explore uncertainty	III, IV

The tension between the imagined crisis and the ‘real’ crisis speaks to a well-recognised truth among crisis management researchers and practitioners alike: crises never turn out as expected. This tension concerns assumptions about the operating environment and understanding of the object of governance. For example, while leading Finnish public health experts had considered *some* transboundary elements of pandemics before COVID-19, they were surprised by the *truly* transboundary character of the pandemic; the experts’ perceptions of the next pandemic changed as a result of the COVID-19 pandemic crossing the customary political, functional and temporal boundaries of crisis management. (Article I.)

Another example is that despite the comprehensiveness of the Finnish security model (Prime Minister’s Office, 2017), a tension still exists between the imagined and real socio-ecological crises induced by climate change (Article II; Article IV; Hukkinen et al., 2022). In this case, the ‘real’ crises refer to crises that might not have materialised to their full extent yet but which have been anticipated by researchers (e.g. Challinor et al., 2018; IPCC, 2023). In the Finnish case, the various indirect impacts may be more significant than the direct local impacts (Article II; Pilli-Sihvola et al., 2018). Yet, the preparedness regime seems to concentrate on the rather manageable, local and direct environmental security impacts only, failing to extensively consider how threats emerging from outside Finland can have strong local effects through chains of events. The main challenges for incorporating environmental issues into security policy are related to their long-term, cross-sectoral and cascading character. For example, the experts acknowledged that geopolitics can impact the effectiveness of climate change mitigation efforts, but they admittedly still mainly consider geopolitical environmental impacts in sector-specific ways. Structural impacts that result from the mitigation of and adaptation to environmental change are likewise still largely unacknowledged, and thus, experts fail to consider how the mitigation of environmental change will affect preparedness and security planning. However, not much research has been conducted on specific chains of events and their impacts, making it challenging for practitioners to adequately prepare. (Article II.) Furthermore, environmental expertise is not well integrated into decision-making and governance, which hinders proactive thinking (Article II; Article IV; see also Virtanen et al., 2022).

The tension between imagined and ‘real’ crises relates to the dilemma that authorities need to address, as mentioned in Chapter 2: the dilemma between anticipation and flexibility. Therefore, the tension not only relates to authorities’ epistemic work on the nature of the operating environment and objects of governance but also to the principles and norms guiding their preparedness: for example, if threats are assumed to be *not-too-transboundary* in nature, then preparedness efforts are based on anticipation and pre-planned responses rather than on enhancing improvisation skills. The Finnish public health experts had devised a solution to the dilemma. Before COVID-19, they addressed the

uncertainty caused by the great diversity of potential pandemic pathogens via an ‘influenza prototype’ approach – thus, the country had a pandemic preparedness plan based on influenza. The experts explained that new types of influenza viruses had caused four pandemics in the last hundred years, and thus influenza can be considered the *most likely* cause of the next pandemic. At the same time, they acknowledged the possibility that other new pathogens can also emerge, and thus influenza worked as a placeholder for any new pathogen causing the next pandemic. While the influenza prototype approach locked in some influenza-specific preparations, the experts maintained that the same measures could be used in pandemics caused by other pathogens. This approach was said to support ‘generic preparedness’, where the focus is not on the specific threat but more on developing response capacities suitable for dealing with any threat. (Article I.)

I find that the influenza prototype approach works more as an *historical analogy*, one of the most commonly used shortcuts when making sense of a new challenge (see Boin et al., 2016). While historical analogies are often extremely helpful in crisis situations, they may be construed as antithetical to imagination since the anticipated response is based on past experiences (e.g. vaccines) and not on exploring the new, alternative types of solutions demanded by a novel situation (e.g. non-pharmaceutical measures). Historical analogies risk directing attention towards certain details or aspects of new crisis situations and ignoring others (Boin et al., 2016). Excessive reliance on historical analogies can lead managers astray more often when global environmental changes accelerate (e.g. Kaaronen et al., 2021), making it necessary for comprehensive security practitioners to consider whether the way they plan for and make decisions about the unknowable future should be changed. The Anthropocene requires a stronger emphasis on *practising improvisation* in a planned, continuous manner (see Chapter 4.2).

Authorities turned to historical analogy (the influenza prototype approach) *before* the pandemic crisis materialised, as the analogy appeared already in pandemic preparedness planning. They had made preparations in cycles of cumulative learning, just like preparedness literature has advised doing (see Staupe-Delgado & Kruke, 2018): the planning efforts had incorporated the lessons learned (including the results of improvisation) from the previous influenza pandemic, the relatively mild 2009 H1N1 pandemic. However, there seems to be a tendency to value the *latest* lessons over older ones and over explorations of imaginative, unforeseen scenarios. At the global level, WHO was accused of overreacting to the 2009 H1N1 pandemic, and experts heatedly debated severity scenarios in international arenas. Plans were revised so that they might accommodate such a mild scenario in a better way. However, yet again after the COVID-19 pandemic, some Finnish experts deemed that severe scenarios and other pathogens besides the influenza viruses should be better considered. (Article I.)

Planning and preparing for past crises is useful to some extent, but it is not sufficient for building preparedness for unseen surprises. Basing pandemic preparedness planning on the experiences of previous influenza pandemics hindered the preparedness imagination of authorities to consider other plausible pandemic futures and the solutions that they might require. For example, the impact of non-pharmaceutical measures was neglected in planning, and there was a lack of a comprehensive, multisectoral evaluation of pandemic preparedness and wide-scale pandemic exercises (Article I). The ‘influenza prototype’ approach also directed attention to droplets as the main mode of transmission of the next pandemic virus instead of, for instance, aerosol transmission (see Ministry of Social Affairs and Health, 2012). In the absence of the immediacy associated with the response phase, imagination could have been employed, for example, in cross-sectoral exercises, to challenge the planning assumptions that had been profoundly shaped by the previous pandemic. However, while many were critical of the current plan, others emphasised that it was better than having no plan at all. The influenza pandemic plan still provided some basis for the ‘constant risk assessment’ that the situation required. (See Article I.)

Finally, the tension between imagined crises and ‘real’ crises can be noticed in the realm of preparedness exercises – however, here the tension is between the imagined exercise scenario and the actual exercise scenario. In the case of the Path-POR exercise, participating politicians and experts thought that the exercise scenario was well-researched and convincing, but the politicians also felt that it was rather ‘bland’. Many of them had participated in exercises before, and based on those experiences, they had expected the Path-POR exercise to have a more extreme scenario and be more difficult to play. In contrast, the student groups that we had invited to participate in the test runs of the Path-POR exercise had been shocked by the exercise scenario. (Article IV; Hukkinen et al., 2022.) This raises questions about the possible undesired effects of the current preparedness exercises. I will return to this topic in the discussion chapter.

The tension between short-term and long-term time horizons hampers preparedness efforts. For example, before COVID-19 authorities did not particularly problematise the length or end point of the pandemic or its long-term effects. They imagined vaccines would end the crisis quickly. The COVID-19 experiences made the experts reconsider the crisis management timeline, and they acknowledged many surprising long-term impacts of pandemics and of measures that had not been imagined beforehand. ‘This is definitely not just a health problem: the social problems worry me tremendously’, one expert reflected and added that once those types of impacts can be observed, then it is often already too late to prevent them. (Article I.) Vaccines have been successful in reducing fatalities and hospitalisations, yet some sectors and populations continue to feel the impacts of the pandemic (Mesiäislehto et al., 2022). What can be learned from the case is that

such transboundary crises can potentially have complex, long-term impacts that will materialise along different timelines in different societal systems. (Article I.)

Furthermore, as the COVID-19 pandemic continued to linger, it defied termination efforts and showed that recovery might not equal a return to normalcy. In general, the material collected during the pandemic shows that authorities were not prepared for a truly transboundary crisis that results in chronically deteriorating conditions. They were not ready to maintain an extended regime capable of continuous entry into and exit from crisis mode. During chronic crises, resource needs can continue to be intense especially in fields already operating with limited resources (e.g. Yle News, 2022), even as politicians may be rushing to declare the crisis over. Politicians may no longer see a chance for political gain by addressing the crisis once the initial momentum has slowed down and shifted to chronic disruptions. (Article I.)

The tension between short-term and long-term time horizons touches upon the epistemic work done by authorities with respect to all three aspects of preparedness imagination mentioned in Chapter 2.4. *Objects of governance* are assumed to be fast-burning rather than slow-burning crises. This in turn impacts *who* will presumably serve in the role of security actors and experts. Finally, by favouring preparedness for short-term events, the preparedness regime can also maintain a *conservative principle* wherein the main goal of preparing is to protect the status quo rather than analyse how current decisions and systems might pave the way to a more volatile world in the long run.

The tension between short-term and long-term time horizons also appears in the implementation of the comprehensive security model among a broader range of practitioners (Article II). This tension is closely related (but not limited) to **the tendency to consider climate change mitigation and adaptation separately**. For example, adaptation and mitigation practitioners do not always integrate their practices. Several interviewees emphasised that there are trade-offs between short-term and long-term thinking caused by the tendency to approach mitigation and adaptation in a siloed manner. The separation makes it harder to devise measures that would be consistent with both the need to mitigate climate change and to adapt to its inevitable impacts. (Article II; see also Virtanen et al., 2022.) The way the POR exercise is designed could help resolve this type of tension by including a broad range of experts (see Chapter 4.2). The research material reveals that authorities largely prioritise short-term goals over a more long-term perspective, whereas effective mitigation actions taken today could reduce the need to increasingly adapt in the future. There is a tendency to focus on the present-day implications of policymaking while ignoring their long-term impacts and the ability to adapt to future changes. Although some experts identify long-term developments in their own sector, such views are often not considered in strategic planning overall. The lack of proactive and cross-sectoral thinking hinders the ability to see

how present choices may lead to new threats in the future. There was no widespread discussion among the interviewees about changing the way they plan for or make decisions about the unknowable future. (Article II; see also Article IV.)

The cooperation model of comprehensive security represents an ongoing attempt to broaden the range of security actors in Finland. Some experts reported that the model has helped them coordinate with a wide range of actors to respond to complex, indirect threats like hybrid influencing, cyber security and climate change (Article II). The public health experts noted that pandemic preparedness is implemented according to the comprehensive security model (Article I). However, some experts mentioned an existing **tension** between the security sector and other sectors – or between so-called **hard and soft security actors**. For example, cyber security and hybrid influencing gain more attention than climate change – and climate change is, furthermore, mainly understood as short-term extreme weather events. It is mainly national-level authorities and traditional security actors who have a sense of ownership of the comprehensive security model, leaving out the broader range of actors whom it, by definition, aims to integrate. The different actors have unequal epistemic authority (see Paananen et al., 2020) over security issues. The tension between hard and soft security actors results in a paralysing bind between principle and practice: the hard security actors fail to imagine the practical relevance of environmental issues for matters of security, and since environmental issues are thus largely absent from the comprehensive security model, such a model remains impractical and abstract for many soft security actors. (Article II.) The pandemic case, on the other hand, highlighted tensions not only between soft and hard security actors but more generally between different sectors: despite the comprehensive security model's promise of effective coordination, cross-sectoral pandemic preparedness and the response to COVID-19 were constrained by a siloed administration (Article I; see also Deloitte, 2021; Kihlström et al., 2022; Mörntinen, 2021).

One further tension that can compromise authorities' preparedness imagination is between **operational/technical and strategic/political crisis management**. Like the tension existing between hard and soft security actors, this one also relates to the epistemic work of appropriate security actors and experts. The agenda-setting national-level actors and local and regional actors view security in different ways: the national-level actors and hard security actors mainly discuss security and the comprehensive security model, while others, like environmental experts, see security as a function of the police or emergency services and are generally not integrated within the comprehensive security model at all levels. (Article II.)

Tensions between different actors' views on crisis termination, or how to establish a 'new normal', appeared in the pandemic case. During the COVID-19 pandemic, experts on the 'technical' side implied that the termination point of the

crisis depended not only on epidemiological factors but also on value-based societal discussion about how best to establish a ‘new normal’ with an altered risk level – yet on the political side, the crisis most clearly ended when another crisis replaced it on the political agenda (Russia’s invasion of Ukraine in 2022). Additionally, the pandemic case showed that the preparedness efforts followed two separate trajectories: experts praised the expert-led technical side of preparedness and response efforts, and they described the ‘messier’ political side as a factor potentially hampering it. (Article I.) For example, political leaders might ignore scientific advice when experts would least expect it. In the POR simulation exercises (Article III; Article IV), experts and politicians were invited to participate in the same exercise sessions to resolve the tension, but some issues still remained, as will become evident in the next section.

Finally, the literature review that I conducted on simulation exercises for Articles III and IV (as described in Chapter 3.2) revealed that studies have either focused on short-term and often operational-level exercises or else on policy games with long-term scenarios for strategic-level thinking, resulting in **a tension between exercises that seek to routinise known response procedures and exercises that help to explore uncertainty**. Both kinds of exercises are useful, but I consider it to be problematic if procedure-testing exercises are the norm while those that would allow for more practice in using imagination and improvisation skills are rarely conducted. According to the existing literature on simulation exercises and based on the WISE project’s interactions with Finnish authorities, simulation exercises often focus on the reactive management of an abrupt, short-term crisis, such as floods or large-scale accidents. Additionally, the literature describes policy exercises that address sustainable resource management or climate policy initiatives but often without including a sudden crisis situation as an element, for example by simulating land-use decision-making processes. The POR exercise was designed to bring those different aspects together, as described in Chapter 4.2.

4.2 Broadening the scope of preparedness imagination

In this section, I explore how the second research question on broadening preparedness imagination’s scope can be addressed based on the articles. Table 3 (below) presents the solutions to each tension separately and in a condensed form, while in the rest of the section the solutions are divided into five thematic groups and discussed in detail.

Table 3 Interrelated tensions that constrain authorities' preparedness imagination and solutions for alleviating them

Tension	Solutions
imagined crises vs 'real' crises	Generic preparedness: evaluating historical analogies; practising improvisation; broader testing of plans; the POR
climate change adaptation vs mitigation	Collaborative approaches: comprehensive risk assessment; multidisciplinary expertise; exploration of systemic threats and vulnerabilities; integration of environmental expertise into decision-making
operational/technical vs strategic/political crisis management	Collaborative approaches: considering social and political factors; the POR
hard vs soft security sectors	Beyond comprehensive security: security discourse across different sectors and organisations; clarifying responsibility for transboundary crises
short-term vs long-term time horizons	Extending the time-frame: considering chronic crises; reconsidering crisis management phases; continuous strategic planning; reconsidering the distinction between routine and crisis modes; the POR
exercises to routinize response vs exercises to explore uncertainty	The POR

1. Generic preparedness:

- developing generalisable strategies
- evaluating historical analogies
- practising improvisation
- broader testing of plans

The principle of generic preparedness – strengthening of the response capacities needed in most crises, such as communication or collaboration structures – can help alleviate the tension between imagined and ‘real’ crises, especially as it becomes more difficult to predict the future. Research on socio-ecological management warns that historical records provide incomplete templates for preparing for an uncertain future in the Anthropocene and urges authorities to identify generalisable strategies for responding to a range of uncertain conditions (see Kaaronen et al., 2021). The statements by pandemic experts reflected this concern; experts cautioned that pandemic preparedness would benefit from an

even more generic approach to planning than before. One expert from THL explained that it is ‘impossible to predict what the next one [pandemic] will be’, adding that: ‘the next couple of years will be dedicated to making a plan that is as generic as possible. One that can account for differences.’ In general, the experts acknowledged the inevitability of surprises: while normal operations provide a foundation upon which to build during a crisis, some buffer in terms of resources and improvisation (new operations) are always needed.

Therefore, and somewhat paradoxically, one way of addressing the narrow scope of authorities’ preparedness imagination is to leave the future as open-ended as possible and focus on capabilities that should be functioning at all times, thus building generic preparedness (Article I). WHO calls this the all-hazards approach (WHO, 2023). One generic capability is improvisation in the face of uncertainty, which could be enhanced through, for example, exercises like the POR (see below). In the Anthropocene, the very nature of change is altering, and extreme phenomena are becoming more common. Crisis management will occur in a new context as global warming and other human-induced changes advance. Thus, preparing and planning for them should be based first and foremost on practising improvisation in a planned and continuous manner, while also ensuring that assumptions regarding the future are frequently revised and updated to match the trajectories of change that we are on.

More specifically, when considering how to make planning generic, the analysis of pandemic preparedness showed that there are always *some* assumptions that guide even generic preparedness practices. The assumptions should be critically examined. The point is not to do away with all historical analogies but instead to test whether the current plans leave enough room for improvisation while still providing useful guidelines for action based on lessons learned from past pandemics (not just the *previous* one) and on explorations of various scenarios in exercises. Experts should aim to establish a careful balance between genericness and specificity when planning: one expert, though, expressed the fear that an overly generic plan would risk offering too little concrete guidance, while another worried about differing interpretations of a very generic plan. One option is to test generic preparedness plans using a range of specific threat scenarios: for example, some pandemic experts suggested the need to consider a broader range of severity scenarios to increase the flexibility of plans. (Article I.) The aim should not be to play out every possible version of future pandemics but to test the plan’s flexibility and build personnel’s capacity to improvise.

The pandemic plan was updated in 2023 (see Ministry of Social Affairs and Health, 2023). At the time of writing this thesis, a draft version had been published (see Ministry of Justice, 2023). Unlike the previous plan, the draft version is not centred on influenza. However, only the next pandemic, or perhaps a simulation

exercise, will provide a test of whether such generic planning indeed offers a balanced mix of genericness and specificity.

2. Collaborative approaches:

- comprehensive risk assessment
- multidisciplinary expertise
- exploring systemic threats and vulnerabilities
- integration of environmental expertise into decision-making
- considering social and political factors

The tension between imagined and ‘real’ socio-ecological crises with respect to the comprehensive security model (Chapter 4.1) is part of a larger disparity between environmental urgency and action (see UNEP, 2023). There are no simple or easy solutions to resolving such tension. Furthermore, the said tension is interrelated with the tensions existing between different actors (technical and political) and sectors (soft and hard security) and with their differing time frames (short-term and long-term frames). To start tackling these tensions, it should be widely acknowledged, at the very least, that no single sector, institution or academic field alone is up to the task of imagining and preparing for such systemic and transboundary threats. Transboundary crises can have complex, long-term impacts that materialise along different timelines in different societal systems, making it necessary to consider crisis management with cross-sectoral and multidisciplinary expertise.

For example, during the COVID-19 pandemic, public health experts called for more comprehensive risk assessments and policy advice based on broad-based expertise since sector-specific approaches were insufficient (Article I). Existing organisations should develop their understanding of systemic threats (e.g. Ringsmuth et al., 2022) and the vulnerabilities of interrelated systems (Boin, 2019). Furthermore, environmental expertise should be better integrated with decision-making and governance at different governmental levels in order to position sectoral practices in a more comprehensive context and alleviate the tension between climate change mitigation and adaptation and their different time frames (Article II).

Also, the statements by public health experts indicated that the technical and political side of preparing have their own trajectories (Article I). Explicitly exploring the interactions across this functional preparedness boundary could be beneficial; prior studies recommend including social and political aspects like leadership and the use of evidence in assessments of pandemic preparedness (Tan et al., 2021). In conclusion, collaborative preparedness practices should be developed in a way that includes different sectors and actors to better address socio-ecological crises. Cross-sectoral simulation exercises (Article III; Article IV) could help experts explore

different sectors' planning assumptions in a collaborative setting, as will be discussed later.

3. Beyond comprehensive security:

- security discourse across different sectors and organisations
- clarifying responsibility for transboundary crises

Conceptual broadening of security has been underway since adoption of the comprehensive security model, as discussed in the previous section, but the degree to which hard security actors shape the model still restricts the current preparedness imagination of authorities in general (Article II). Scholars have suggested that the field of security may need to become more open to new issues, actors and practices to better deal with environmental threats (e.g. Floyd, 2016; Oels, 2012; Trombetta, 2010). If actors in the security sector have no interaction with outside perspectives – maintaining a narrow view of the appropriate security actors who can take part in policy-making – then they might not be able to prepare for new kinds of threats in a proactive manner. With a narrow understanding of security actors and security, the most serious threats are imagined to be military threats (e.g. Heino et al., 2022), leaving out, for example, cascading and long-term aspects of environmental threats that are already on their way (Article II). To broaden the scope of authorities' preparedness imagination, the comprehensive security model would have to encourage more discourse across different sectors and organisations on just what security and preparedness entails and what exactly are the objects of governance.

Furthermore, in relation to the paralysing bind discussed previously (Chapter 4.1), the distributed model of comprehensive security needs to allow for institutional empowerment. The hard security organisations should accept decentralised managerial authority over environmental security matters among the relevant actors involved in comprehensive security since the soft security organisations are, after all, experts on matters of environmental security. (Article II.) In general, transboundary crises usually complicate the identification of one clear crisis owner (Boin, 2019); yet the comprehensive security model is based on just such an assumption. Thus, clarifying responsibility for transboundary crises in the national crisis regime is needed. Authorities should consider distributing responsibility for systemic situations to more than one acting ministry and clarifying the coordination of distributed responsibilities in, for example, the Prime Minister's Office. (Article I.)

4. Extending the time frame:

- considering chronic crises
- reconsidering crisis management phases

- continuous strategic planning
- reconsidering the distinction between routine and crisis modes

Exploring the temporal dimension – the tension between short-term and long-term time horizons – of authorities’ preparedness imagination is necessary to better address the different long-term impacts of environmental changes and chronic and overlapping crises. The current, relatively static view of economic and societal systems exhibited by authorities in terms of their preparedness imagination (Article II; Article IV) should be challenged. Chronic socio-ecological crises demand that authorities reimagine crisis management by adopting a systemic and long-term perspective.

In effect, authorities need to reconsider the crisis management phases of mitigation, preparedness, response and recovery: in chronic crises, recovery might not equal a return to normalcy. Chronic crises essentially mean that there might be no ‘normal’ in between different disruptions – the next crisis must be met while still recovering from the previous one. Continuous strategic planning and analysis of how urgent decisions affect the long-term capacity of critical systems (e.g. health care) to deal with crises would be critical practices to develop. (Article I.) When preparing, authorities should also keep in mind that planned responses might only work for *one phase* of a crisis and not in the long run, making other complementary strategies necessary (De La Garza and Lot, 2022).

Different actors have different time frames of action, and thus cross-sectoral practices can help to extend crisis management’s timeline for covering long-term crises, as mentioned earlier. Also, operational and political actors should both individually and together consider chronicity when preparing, as the termination of crises and the establishment of ‘a new normal’ is a different task for each side (Article I). From a political standpoint, designing a plan for recovering from chronic crises should involve active value probing (Boin et al., 2016; see also Eriksson et al., 2022) regarding what constitutes successful and legitimate crisis management, including from a long-term perspective. On the operational side, it might be necessary to reconsider the distinction between routine and crisis mode, as some crisis-induced practices might have to be continued for a long period of time (e.g. surveillance in the case of the pandemic). (Article I.) With respect to other tensions, the POR framework for conducting simulation exercises can be used to alleviate the tension between short-term and long-term time horizons, as illustrated next.

5. The Policy Operations Room:

- a platform for considering long-term impacts of urgent decisions
- decision-makers and experts as participants
- under ongoing development

The POR is a new framework for practising and analysing strategic crisis management (Article III; Article IV). Many of the tensions, such as imagined vs ‘real crises’, short-term vs long-term time horizons, operational vs strategic crisis management and climate change adaptation vs mitigation, motivated the design of the POR framework. I suggest that PORs can be used to help broaden the scope of authorities’ preparedness imagination. However, the POR, as described in Article III and Article IV, still needs to be developed further to fully deliver on its promise.

PORs are designed to make the future – something cognitively hard to reach – present for participants in the simulated decision-making situation through imagination and performance (Anderson, 2010). The PORs were designed to provoke the participants’ imagination by allowing them to explore alternative futures and critically reflect on their modes of thought (Hukkinen et al., 2022). The POR framework could help authorities take a more planned approach to improvisation; it could support them in updating preparedness and planning initiatives to better respond to changes in the Anthropocene era, where the capacity to improvise in unknown conditions is needed more than ever. The participants included decision-makers, experts and administrators from different sectors and researchers who observed their decision-making processes. By inviting participants with diverse values and backgrounds to this collaborative setting, we created a space for social learning where the participants changed their understanding of a given scenario through interacting with others (den Haan & van der Voort, 2018). Such a setting can help alleviate the tensions between different security actors and policy areas and also between different political and technical actors. PORs allow the participants to perform the roles assigned to them but also to reflect on their performance, offering them a chance for ‘double-loop learning’ (simultaneously learning how to do things and learning to learn how to do things) (see Article IV).

The goal of the POR was not to familiarise the participants with a specific scenario as part of the exercise but instead to enable them to learn a new way of approaching urgent decision-making matters while also accounting for the long-term impacts. Since the participants are invited to confront realistic socio-ecological scenarios based on multidisciplinary scientific assessments, the POR can help them explore and alleviate the tension between imagined and ‘real’ crises. Besides allowing various experts to practise and study simulated strategic crisis management, the POR could be developed into an actual decision-making instrument (see Hukkinen et al., 2022).

Most importantly, the POR is a framework for bringing together the need to make urgent decisions and engage in long-term planning, and as such, it can help authorities overcome the tension between short-term and long-term time horizons when preparing and broaden their preparedness imagination. The design of the POR draws especially from high reliability management research and studies of simulation exercises. The former helps authorities focus on long-term reliable

management with foresighted crisis avoidance (staying within the realm of known risks), and the latter offers them insights into decision-making in urgent crisis situations (assuming unknown operating conditions) and provides detailed design solutions for simulated decision experiments. (Article III.)

The POR framework is designed to allow the participants to apply the decision principles of high reliability control rooms in strategic policy-making situations characterised by ‘urgent decisions with long-term lock-in effects’ (Article III, p. 2). Lock-in effects refer to the technological, economic, institutional and cognitive path dependencies affecting socio-ecological systems (e.g. Hughes, 2012). Political decision-makers struggle with short-term versus long-term time horizons in such a way that they often resort to solutions that secure their own career in the short term while avoiding the types of decisions demanded by long-term sustainability crises. By presenting long-term scenarios to the participants in the POR, we essentially put them in a ‘time machine’ that forced them to address issues normally excluded from policymaking.

The POR helps to confront the tension between exercises that routinise response and exercises that make it possible to explore uncertainty and improvise: the POR offers a new approach to such exercises since it lets policymakers live through the consequences of today’s urgent choices as future policymakers. As described earlier (Chapter 4.1), the review of the existing simulation exercise literature showed that such scenario-based exercises that allow participants to systematically track a series of urgent decisions and their long-term path-dependencies are rare – especially exercises in which decisions are not made during one-off crises but during more chronic socio-ecological crises. Additionally, the interest shown by municipal policymakers in co-organising and participating in the POR exercises tells us that such approaches have not previously been employed in Finland. (Article III; Article IV.)

The POR design included three variations (see Article III for more details). Here, I focus on the Path-POR (Article IV), which has been the type of POR most central to my own work. Below, I explain the ways in which the Path-POR failed to deliver on its promises. The first official Path-POR was organised in Helsinki in 2019. It was a half-day exercise, and the city’s top politicians and experts from different sectors participated (e.g. environment, energy, land use, transportation, finance). We drew from previous studies on Helsinki’s climate policy (Vadén et al., 2019), including climate change adaptation (e.g., Kankaanpää, 2017), to create a wicked science-based scenario that the participants would explore by ‘time travelling’ to different imagined futures (Article IV; see also Hukkinen et al., 2022). The exercise was designed so that the participants travelled to such imagined futures at ten-year intervals, allowing them to explore the connections between the short- and long-term time horizons of their decisions. For a detailed explanation of the exercise structure, see Article IV, section 3.3.

In evaluating how successful the Path-POR was in facilitating learning among policymakers, we concluded that more political complexity should have been included – in addition to the technical-physical complexities and social aspects (see Mayer, 2009) that we managed to cover. The politicians thought the exercise was ‘too easy’ because it did not include their usual stakeholders, party alliances, media representation or re-election issues. We had assumed that the politicians would bring political urgencies and power play to the exercise, without realising that municipal decision-making is based more on consensus. In the post-exercise interviews, the politicians took pride in their professional leadership and tended to downplay conflict, emphasising instead efficient management within shared political-economic boundaries. Additionally, we suspect that the familiarity of the routine decision-making setting (their usual meeting room as the exercise location) proved to be suboptimal: the participants stayed within their usual roles, meaning that experts only talked when politicians consulted them (Article IV).

While the Path-POR created a space for friendly, well-articulated discussion and allowed the participants to learn from each other and from the scenario, it did not excel in creating deep dialogue or intense political debate, and thus, the opportunity for critical reflection was left unexplored. The exercise did not encourage the participants to practise improvisation. Thus, the Path-POR should be further developed so that it would force the participants to reflect more on their routine decision-making practices. We assume that their thinking and discussion could have been pushed further with a more politically engaging and challenging scenario. However, the participants and co-organisers gave quite positive feedback about how the Path-POR allowed them to assess future path dependencies created by today’s decisions – something that is not systematically done in Helsinki with respect to climate policy. (Article IV.)

While offering participants an opportunity for long-term thinking, the Path-POR failed to deeply challenge them in other ways, and thus, it cannot readily be considered a miracle cure for broadening the scope of preparedness imagination (see also Chapter 5). However, the Path-POR’s failures did provide us with important lessons. For example, the Path-POR’s execution taught us that better involvement on the part of experts should be encouraged in future PORs, shaking up the normal expert-politician relationship where experts only speak when called upon to do so (Article IV). Thus, only experts and administrators were invited to participate in the Bayes-POR exercise organised in the city of Kotka, in eastern Finland, in 2021 as part of the WISE project. Two separate POR exercises were organised as part of the subsequent LONGRISK project (<https://www.helsinki.fi/en/projects/longrisk>): one for experts and administrators and a second one for experts, administrators and decision-makers together.

Also, we observed that the decision-makers taking part in the Path-POR were less emotionally involved than the test groups comprised of students (see Article

IV; Chapter 5). Thus, in later versions of the POR we made more of an effort to engage the participants with the given scenario. In the exercises organised as part of the LONGRISK project, the participants were shown a mock-up TV climate news programme and a 3-D drone view animation of a flood in the Helsinki city centre, among other things, to affectively engage them. This approach can be seen as an effort to turn abstract *known-corporally unknowns* (long-term sustainability issues) into something more 'lived-through' and 'embodied' (see Ekengren, 2024). However, it remains an open question why exactly the Path-POR participants acted so differently in comparison with the students. I will return to this topic in Chapter 5.

5 Discussion

We absolutely can drive towards a more sustainable, more equitable world. But our ability to navigate through the shocks while staying focused on steering out the storm is key. – Laurie Leybourn (as cited in Carrington, 2023)

In this chapter, I discuss the implications of the results presented in the previous chapter. Additionally, I discuss the limitations of this study and suggest future directions for research.

5.1 Implications of the results

At a general level, the thesis has explored the juxtaposition of what preparedness *is* and what it *ought* to be in an era of chronic socio-ecological crises (see IPCC, 2023). The work illustrates that the preparedness regime – especially its preparedness imagination – should be updated to better match the needs of the current era. In line with previous studies on preparedness imagination (e.g. Heino et al., 2022), I maintain that analysing the preparedness imagination of authorities can help reveal vulnerabilities generated by the preparedness regime itself. In other words, I argue that this approach has allowed me to make some second-order observations (to observe observations) about current preparedness planning in a Finnish context: I have observed the preparedness regime’s observations (epistemic work) about the operational environment, about the appropriate security actors and about the nature of adequate preparedness. Here, I approached authorities’ preparedness imagination as potentially having serious impacts on how future crises are addressed.

I have applied the concept of preparedness imagination to analyse a rich set of empirical data, examining preparedness beyond just the statements found in the national-level policy documents. This approach has resulted in a fine-grained image of how socio-ecological crises can be covered by the preparedness regime given the current preparedness imagination of authorities. Yet, it is also inevitable that the chosen empirical cases offer only a limited perspective on Finnish comprehensive security practices. Preparedness is organised in a decentralised way; a multitude of public officers and decision-makers at all levels of governance and across different sectors in Finland take part in preparedness practices. This means that

comprehensive security measures might appear somewhat different from the perspective of some other organisations and sectors, for example educational services or transportation and communications agencies. Therefore, even though I draw cross-case conclusions based on the chosen cases, the limited number of cases and limited amount of data are weaknesses of the study that must be accounted for when making analytical generalisations here (see also Chapter 5.2). However, the differences among the chosen cases can also make the cross-case conclusions stronger: this set of cases allowed me to test my results in different contexts.

The thesis contributes to crisis management literature by offering an in-depth analysis of how preparing for and making sense of socio-ecological threats can be compromised by a narrow preparedness imagination. My analysis of authorities' preparedness imagination has helped shed light on the epistemic conditions that allow authorities to detect emerging threats. In practice, I have shown that a set of interrelated tensions constrain how Finnish authorities prepare for the future: some tensions concern mainly the ontology of the environment (imagined crises vs 'real' crises; short-term vs long-term time horizons), others concern different security actors and policy areas (operational/technical vs strategic/political crisis management; hard vs soft security sectors; climate change adaptation vs mitigation) and, in one way or another, all of them relate to the principles and norms guiding authorities' preparing. I suggest these tensions make it harder for the different authorities to prepare especially for socio-ecological crises that do not respect customary managerial or temporal boundaries (e.g. Ansell et al., 2010).

Based on the empirical material of this study, I argue that the current preparedness imagination of authorities contributes to an illusion of control in the preparedness regime. For example, the complex, transboundary aspects of crises can be reduced in the preparedness phase, leaving the regime to work with simplified scenarios in its plans and exercises (Article I; Article II; Article IV). For example, the preparedness regime can maintain the illusion of control by focusing on preparing for direct and local impacts of environmental change while neglecting the indirect and structural impacts (Article II; see also Pilli-Sihvola et al., 2018). Experts often imagine impending crises and the means for resolving them in a short-term time frame, with each scenario having a clear 'owner'. Accordingly, crises are followed by a recovery phase and a return to normalcy, meaning preparing for chronic crises is neglected. (Article I; Article II; Article IV.) Thus, the regime works with fantasy plans (Clarke, 1999), which contain historical analogies that can limit the use of imagination; neither are such plans properly tested, ultimately contributing to unwarranted optimism about how potential threats can easily be controlled. For instance, pandemic preparedness planning was based on efficient considerations of how to manage a threat that best matched current response capacities (influenza vaccines), while neglecting other scenarios (Article I). In its current form and implementation, the Finnish comprehensive security

model for civil society preparedness seems not to have resulted in a truly cross-sectoral and multidisciplinary preparedness imagination. On the contrary, the neatly delineated responsibilities in preparing allows for a lack of imagination in one sector to constrain the use of imagination in other sectors, when omissions made by a ‘threat owner’ in a national threat scenario can travel across numerous sectors. (Article I; Article II; Article IV.)

To counter the effects of the illusion of control, I argue that the preparedness regime needs to better allow the exploration and acknowledgement of uncertainty related to potential threats. Opportunities should be taken to feed the feeling of uncertainty (Heino et al., 2022) instead of suggesting strong control of the operating environment. More effort could be given to considering how the preparedness regime itself, with its current preparedness imagination, can be a source of or contribute to threats and vulnerabilities. More reflection especially on the way preparedness and planning is done not only for well-known crises (e.g. local environmental impacts) but also for the unknowable future is needed in the current era of chronic socio-ecological crises (Article I; Article II; Article IV; see also Branders, 2016; Heino et al., 2022; Hukkinen et al., 2022). To effectively create a continuous, dynamic process of ‘planning, exercising, simulating and revising’ (Staupe-Delgado & Kruke, 2018, p. 216), preparedness in the Anthropocene should not only be about incorporating lessons learned from past crises but also about practising improvisation in the face of uncertainty. Practising improvisation needs to be at the core of preparing for crises in the Anthropocene, accompanied by frequent revisions of what constitutes the ‘new normal’ in the current trajectory of environmental changes. When 1000-year extreme weather events are first becoming 100-year events and then ten-year events, strategies, plans and practices need to embrace such changes.

To broaden the scope of authorities’ preparedness imagination and to alleviate the above-mentioned tensions (see Chapter 4, Table 2), the comprehensive security model would truly have to encourage discourse across different sectors and organisations on just what preparedness entails. For example, the traditional security field should open itself up to new actors and issues. Scenarios that guide preparedness planning should be built in a multidisciplinary manner and explored in a cross-sectoral manner. (Article I; Article II.) More specifically, platforms like the POR exercises (Article III; Article IV) could offer one way of institutionalising the use of imagination in preparedness practices. They can be designed to help authorities explore uncertainty and practise improvisation rather than only test routine procedures, thus helping them expand their preparedness imagination. Such exercises should encourage the preparing actors to consider issues that are normally outside policymaking, like a longer time frame and the chronicity of crises, and the exercises should make it possible for different actors to test their planning assumptions in a collaborative setting (Article III; Article IV). Finally, the POR

could promote a culture of safety in organisations where not only known risks, but also faint signals of emerging threats, are explored in meaningful ways (Boin et al., 2018; Webb, 2018). Since global environmental changes are accelerating and the ability to reliably predict possible future events is decreasing (Folke et al., 2021; IPCC, 2023; Kaaronen et al., 2021; Nyström et al., 2019), the future can be better explored if the use of imagination (and performance) complements probabilistic calculations (e.g. Anderson, 2010; Staupe-Delgado & Kruke, 2018). The point is not to better predict the future through the use of imagination but rather to learn how to better improvise in the face of uncertainty. Yet, further development and testing of the POR is needed before it can deliver on its promises.

On paper, the comprehensive security model encourages authorities to prepare proactively and supports the detection of emerging threats (Prime Minister's Office, 2017; Chapter 3.1). However, in the studied cases Finnish authorities paid more attention to a rather limited number of *familiar risks* (e.g. local natural disasters, certain viral pathogens), and thus, the preparedness regime maintains a reactive orientation towards detecting emerging socio-ecological crises (Article I; Article II). Furthermore, the preparedness regime has an effective way of taming the uncertainty related to threats: the National Risk Assessment (Ministry of the Interior, 2019) makes all threats comparable by turning them into *risks* with an estimated trend of likelihood and possible impacts on vital functions (see Chapter 3.1), a process that supports the illusion of control rather than recognises and nurtures a sense of uncertainty. Such techno-scientific estimations contribute to an unquestionable ontological authority (e.g. Paananen et al., 2023), which forms the basis for preparedness policies. For example, the National Risk Assessment finds that an influenza pandemic would have negative impacts but would not severely compromise any of the vital societal functions. According to the Assessment, it will have the smallest impact on leadership and international and EU activities. (Ministry of the Interior, 2019.) Compared to other threats, the Assessment does not consider the pandemic a particularly serious threat, and, therefore, after the COVID-19 experiences some researchers have questioned the commensurability of such evaluations (e.g. Sissonen, 2023; Heino et al., 2022).

Crisis management studies warn that when certain types of known risks are well detected by the established detection systems, blinders can be created that hinder the detection of previously unknown and unimagined crises (Boin et al. 2016; Branders, 2016; Heino et al., 2022). Pilli-Sihvonen et al. (2018) suggest that while current climatic variations and disaster risks might be well known in Finland, qualitatively new threats might come as a surprise even though they could be anticipated. Sense-making in the Anthropocene should be sensitive to the 'nonlinear and emergent nature of crises' and give 'particular attention to anomalies or surprises as critical reference points around which to engage' (Ansell & Boin, 2019, p. 1090). It will always remain a challenge to establish surveillance systems

for unique crises (Ansell et al., 2010), but exploring alternative futures in the POR exercises might improve the analytical capacity of authorities and decision-makers to take anomalies seriously and thus improve the detection of emerging threats.

Yet for a timely recognition of emerging threats, information is not only needed about the operational environment but also about systemic and organisational vulnerabilities (Boin & Rhinard, 2023; see also Branders, 2016). The use of preparedness imagination by authorities should extend to an exploration not only of how threats can come from outside the preparedness regime but also might be caused by it. For example, the types of structural environmental security impacts that can result from certain mitigation measures deserve just as much attention as do possible direct and local impacts (Article II). Also, the current lack of preparedness for chronic crises is a potential source of organisational vulnerability, as the planned responses might only work for one phase of a crisis and not over the long term (Article I). Thus, evaluating the existing strategies and, for example, infrastructure systems in the light of alternative future scenarios featuring chronic socio-ecological crises (as in Article IV) would help broaden the scope of authorities' preparedness imagination.

The Finnish comprehensive security model is, essentially, a cooperation model (see Chapter 3.1). Yet, despite a long tradition of working across sectors and organisational boundaries (Article I; Chapter 3.1; Pilli-Sihvola et al., 2018), an overarching issue that the tensions presented in Chapter 4 touch upon is that of cooperation. For example, the statements continually released by health experts, both before and during the COVID-19 pandemic, about the lack of a comprehensive evaluation of pandemic preparedness and their appeal for a more comprehensive preparedness reveal much about a dispersed and uncoordinated cross-sectoral preparedness effort at the national level (Article I). Rivalries exist between different administrative sectors (Valtonen & Branders, 2020), for example between hard and soft security actors (Article II). The Finnish comprehensive security model is a classic example of a bureaucratic administrative system that is 'based on boundaries and demarcation' (Boin, 2019, p. 95) and clearly delineated responsibilities and areas of expertise. The model might actually encourage functional differentiation and work against the ideal of comprehensiveness when tasks are neatly distributed between different responsible authorities (Branders, 2016). The model can also result in a functionally differentiated preparedness imagination, as in the pandemic case (Article I), which makes it challenging to address slowly creeping crises and transboundary crises that demand broad structural transformations. Thus clarifying responsibility for transboundary crises in the comprehensive security model might prove useful. Responsibility for systemic situations should be distributed to more than just one ministry, and clarifying the coordination of distributed responsibilities, for example in the Prime Minister's Office, could be considered.

Although the POR framework offers one promising way to extend the crisis regime's epistemic boundaries – the conditions structuring the imagining of future crises – it is still a work in progress (Chapter 4.2; Article III; Article IV). For example, in the very first POR experiment in Helsinki in 2019 (Article IV), a certain 'capitalist realism' (Fisher, 2009) narrowed the preparedness imagination of authorities: they framed considerations outside the field of economics as implausible and unlikely to succeed (Hukkinen et al., 2022). In other words, the professional decision-makers 'accepted the premises of current cognitive-institutional pathways' (Hukkinen et al., 2022, p. 6) that downplay environmental issues while focusing on economic considerations.

The exercise should have more effectively forced the participants to consider how socio-ecological crises are rooted in societal dependencies (e.g. Boin et al., 2021b). They defined the problem space of the complex scenario of the exercise as being under their control. In effect, they hindered the practice of imagining alternative futures and downplayed the need for long-term considerations, thus reducing the complexities, unpredictability and uncertainty related to socio-ecological crises and making it seem that authorities already possess the means to deal with such crises, similar to what Heino et al. (2022) observed in the security policy documents. In stark contrast, the student participants in the Test-PORs accepted the problem space of the existential sustainability crisis as 'ill-defined and requiring critical thinking and systemic change' (Hukkinen et al., 2022, p. 6). Furthermore, the politicians considered the Path-POR to be 'bland', while the student participants had been shocked by the same exercise (Chapter 4.2; Hukkinen et al., 2022). However, our research team also gained encouraging results from a Bayes-POR exercise organised only for experts in the city of Kotka: the participants used the exercise as an opportunity to critically reflect on the viability of the city's strategies in light of the exercise's complex, long-term crisis scenario.

The observations raise questions about the potential undesired effects of the current simulation exercise routines and also give some perspective on how the POR could be developed further. In Finland, most of the top leaders and officials had attended national defence courses (Valtonen & Branders, 2020) and, at best, several simulation exercises (Article IV), unlike the students. It is worrying that the decision-makers found an exercise designed to make tangible the long-term effects of urgent decisions a dull experience compared to their previous training experiences (Article IV). The current exercises might thus fail to provide opportunities for organisational change (Johansson et al., 2018; Smith, 2004). I suggest that delving more deeply into the current exercises organised by the preparedness regime would be a fruitful area of future research; especially investigating their affective side, since the reactions of the decision-makers and students were so different. I suspect that despite succeeding in being more thrilling for the participants, the majority of the current preparedness exercises might

actually contribute to a sense of ‘symbolic readiness’ (Scott et al. 2015, p. 89), thus supporting the illusion of control: if they focus on shocking but short-term crisis scenarios, they might further diminish the possibilities of detecting creeping crises that do not readily fit authorities’ established ideas about crises. In this light, the POR offers a fresh alternative, but its design could benefit from, for example, strengthening the experts’ role, as mentioned in Chapter 4.2.

Engaging the participants emotionally in the latest versions of the POR exercise has proved promising in terms of inspiring them to consider alternative strategies for their city. By showing them a mock-up climate newsreel and animation of a flooding Helsinki city centre, the LONGRISK project researchers have perhaps managed to take steps towards turning the rather abstract knowledge regarding socio-ecological crises, ‘known-corporally unknowns’, into a more tangible ‘personal, bodily experience’ (Ekengren, 2024, p. 1) for the participants. One ongoing challenge is the need to develop the POR so that it can serve as an efficient platform for delivering and imaginatively and emotionally exploring scientifically based understandings of socio-ecological threats to/with the politicians, who have been inadvertently trained to be rather myopic in their management of crises. One of the greatest challenges is to create a scenario that is complex enough to resemble real socio-ecological crises of the Anthropocene but simple enough to be understandable and executable as an exercise. The LONGRISK project’s versions of the POR have been more successful in prompting the participants to consider alternative strategies, but, at the same time, they have taken a turn towards simplifying the crisis scenarios. Even though conducting exercises (beyond the PORs) is a promising avenue for authorities to explore uncertainty and practise their improvisation skills, exercise scenarios can never truly replicate the complexity of the polycrisis in the Anthropocene.

As discussed in Chapter 2.3, *resilience*, or maintaining flexibility in the face of uncertainty and complexity, has gained currency in recent preparedness studies (e.g. Staupe-Delgado and Kruke, 2018). This *resilience versus the anticipation of risks* dilemma seems to touch upon one of the dimensions of epistemic governance (Alasuutari & Qadir 2014) related to preparedness: the nature of virtuous or acceptable preparedness. Based on the document material and earlier research (e.g. Hyvönen & Juntunen, 2020), the Finnish comprehensive security model seems to emphasise the idea of *protecting the status quo* (on securing existing vital societal functions, see Chapter 3.1). Even when Finnish security and preparedness policy documents explicitly refer to resilience, the emphasis is on ‘bouncing back’ rather than ‘bounding forward’ (Hyvönen & Juntunen, 2020). Thus, the Finnish preparedness regime together with its comprehensive security model engage in the types of preparations that would help maintain current operations and systems – even when current decisions and systems would drive everyone into a more volatile world (e.g. Path-POR participants valued economic growth over everything else).

However, I would suggest that strategic initiatives (positive visions of the future) should not be lost, even when emphasising uncertainty and resilience (see Villumsen Berling & Lund Petersen, 2020): governing security with the comprehensive security model should not only mean protecting current operations and systems but also being ready to radically transform those functions and move society in a more sustainable direction.

5.2 Limitations and future research

The case study approach of this research project has some limitations. The qualitative nature of the results and the relatively small ‘sample’ sizes (number of interviewees, policy documents and exercise participants) do not allow for statistical generalisations. Finland, with its small population size, has a very small pool of experts and decision-makers, especially on topics like pandemic preparedness. However, analytic generalisations can be made based on case-study research when the goal is to expand on theories; to shed empirical light on theoretical concepts (Yin, 2017). I suggest this case study provides an in-depth and practical understanding of authorities’ preparedness imagination in one context (Finland) – yet in such a way that the resonance with studies of preparedness imagination in other contexts (studied by other researchers) can be found in the studied elements, dynamics and relations (Lund, 2014).

Identifying preparedness and preparedness imagination in the ‘field’ is a critical task. All Finnish authorities are required to prepare for crises (see Chapter 3.1), and, inevitably, what counts as preparedness can look quite different depending on the sector and organisation. Thus, when choosing to analyse the concrete, empirical manifestations of the more abstract phenomenon of preparedness and preparedness imagination, researchers run the risk of missing the initial object of interest and analysing a variety of different phenomena instead of just one. To counter this potential problem, I ensured construct validity (the identification of correct operational measures for the concepts being studied) by using multiple sources of evidence on preparedness and by giving an active role to the case study informants’ interpretations of their own work.

Caution must still be taken when drawing cross-case conclusions. Even though Article II and the POR exercises covered a broad range of actors, more interviewees, organisations and sectors should have been included in the thesis as a whole. It would have been fruitful, for example, to analyse more extensively the so-called hard security sector, where the comprehensive security model has its strongest hold and longest history (see Chapter 3.1). Such material would have better shown the validity of observations regarding the tension between soft and hard security actors (see Chapter 4.1). Alternatively, focusing only on one administrative level but across different sectors might well have resulted in stronger conclusions since the cases

would have more closely followed the logic of replication. Such limitations highlight opportunities for future research.

Drawing broad-based conclusions about authorities' preparedness imagination to deal with socio-ecological threats based on an analysis of their *pandemic* preparedness could be criticised as far-fetched. Yet, I maintain that a pandemic is a prime example of social and ecological systems becoming intertwined in problematic ways (see also Chapter 1.1) and that the extended timeframe of the COVID-19 pandemic offers insights on managing chronic states of continuous entry into and exit from crisis mode (see Article I). Alternatively, pandemics can be considered examples of crises that are *not complex enough* compared to other possible socio-ecological crises of the Anthropocene. However, a close reading of the COVID-19 case (Article I) shows that it was quite far from being a simple crisis. By combining the pandemic case with cases on the environmental aspects of the comprehensive security model (Article II) and the POR exercises (Article III; Article IV), I created a set of cases that, taken together, allowed me to test my results in different contexts.

Case studies have been blamed for subjective bias, referring to a tendency to confirm the researcher's preconceived ideas. However, the subjectivism inherent to such a research approach will most likely be corrected by the objects of study 'talking back', whereas arbitrary subjectivism could survive, for example, in the choice of variables in a structured questionnaire (see Flyvbjerg, 2006). The choice to use multiple data sources and forms of data in the thesis made it possible to triangulate the results. Also, long-standing contact with and discussions with the informants, especially during the pandemic case (Article I), and with other researchers and policymakers (Article II; Article IV) further lessened the chance of bias. My position as an office holder during part of the data gathering process for Article I can be criticised as biased, but I maintain that it offered me a chance to gather unique and valid data. I discussed my field observations in interviews with the experts to minimise bias.

I maintain that Finland serves as an interesting case especially because of the country's comprehensive security model: the observations and lessons based on the Finnish case have broader appeal since the multi-level, cross-sectoral cooperation model (Article II) could potentially be applied in other countries seeking to better address socio-ecological crises. Similarly, even though the observations from the POR exercises organised in Finnish cities are unique and context-dependent, the POR exercise design itself (Article III; Article IV) is applicable to other contexts beyond Finland, which also face a need to consider the long-term consequences of urgent environmental decisions. The exercise is applicable because its design principles are conceptually and theoretically based on prior research on related experimentation efforts (see Hukkinen et al., 2022). Further research on the impact of POR exercises on actual preparedness could be conducted in subsequent

projects. As mentioned earlier, I would also like to spend more time studying the existing exercises organised by the preparedness regime to investigate their potential unwanted side-effects, such as making creeping crises feel dull (see Chapter 5.1). Additionally, it would be interesting to continue working with the pandemic preparedness experts and to further analyse the extent to which the new preparedness plan represents a balanced mix of genericness and specificity (see Chapter 4.2).

Future studies could also explore how to best turn the POR framework into a decision-making instrument for urgent situations. The design of the Path-POR exercise organised in Helsinki in 2019 is likely too time-consuming (Article IV). Hukkinen et al. (2022) have further explored the key design principles of such a decision platform and engaged in on-going collaboration with different municipal, national and even international stakeholders. The POR could work as a tool for testing and developing decision-making capabilities in other complex policy areas, like security of supply.

6 Conclusion

Our main aim should still be radical emissions cuts to try to avoid breaching 1.5C, but we should now also be considering what happens if we continue to fail. – Bob Ward (as cited in Carrington, 2023)

The thesis presented a case study on the preparedness imagination of Finnish authorities to deal with socio-ecological crises. Using preparedness imagination (Heino et al., 2022) as my analytical lens, I observed the preparedness regime's observations – epistemic work (Alasuutari & Qadir, 2014) – about the operational environment, about the appropriate security actors and about the nature of adequate preparedness. To explore and synthesise the findings of the individual articles, I posed the following research questions in this thesis summary: 1) What factors prevent the current preparedness imagination of authorities from recognising socio-ecological crises in Finland? 2) How can the scope of their preparedness imagination be adjusted to better address chronic socio-ecological crises? In other words, I explored the juxtaposition of what preparedness is and what it ought to be in the Anthropocene, thereby illustrating that the preparedness regime – especially its preparedness imagination – should be updated to better match the current era.

My analysis of authorities' preparedness imagination in empirical cases involving the Finnish comprehensive security model, pandemic preparedness and simulation exercises in Finnish municipalities illustrates that a set of interrelated tensions currently constrains how Finnish authorities prepare for the future. The tensions constitute some of the epistemic conditions that allow authorities to make sense of socio-ecological threats: the tension between short-term and long-term time horizons in preparedness is formidable. The tension between so-called hard and soft security actors is strong, as is the tension between the operational and strategic level of preparedness. Climate change adaptation and mitigation efforts likewise suffer from such unproductive tension. In the realm of preparedness exercises, a further tension exists between exercises that seek to routinise response and exercises that allow participants to explore uncertainty. Lastly, since crises never turn out as expected, there remains a tension between imagined and 'real' crises. Due to these tensions, many of the transboundary aspects (Article I) – the long-term, cross-sectoral, and cascading aspects – of socio-ecological threats are

not being considered by practitioners working in siloed administration, despite the promising comprehensive security model for civil society preparedness.

The preparedness regime, given such sources of tension in authorities' preparedness imagination, is taming deep uncertainty and complexity related to threats. Inadvertently, it thus maintains an illusion of control by focusing on preparing for more direct and local impacts of environmental change while neglecting the indirect, structural and long-term impacts of it. By pointing out the illusion of control, I wanted to highlight the limitations of traditional approaches to crisis detection, which tend to focus on known risks and fail to account for the interconnections between different threats. The illusion of control supports a false sense of security and prevents stakeholders from adequately preparing for the full range of possible threats. In its current form and implementation, the Finnish comprehensive security model has not resulted in a truly cross-sectoral and multidisciplinary preparedness imagination among authorities.

I have argued that the preparedness regime needs to make more allowances for the exploration and acknowledgement of deep uncertainty related to potential threats. Since global environmental changes are accelerating and the predictability of the future decreases (Folke et al., 2021; IPCC, 2023; Kaaronen et al., 2021; Nyström et al., 2019), the future can be better explored if the use of imagination complements probabilistic calculations (e.g. Anderson, 2010; Staupe-Delgado & Kruke, 2018). The point is not to better predict the future with imagination, but to rather learn how to better improvise in the face of uncertainty. Opportunities should be taken to feed the feeling of uncertainty (Heino et al., 2022) rather than rigidly adhering to a strong sense of control over the operating environment. I propose that more effort should be taken to consider how the preparedness regime itself, with its current preparedness imagination, can be a source of or contribute to threats and vulnerabilities.

Crisis analysts and practitioners alike should acknowledge that there is a serious need to reimagine crisis management in an era of chronic socio-ecological crises. This thesis has focused on developing a more imaginative and inclusive approach to crisis management that can better account for the complex and interconnected nature of threats in the Anthropocene. This research project contributes to crisis management literature by offering an in-depth analysis of how preparing for and making sense of socio-ecological threats can be compromised by narrow preparedness imagination on the part of authorities. The analytical lens of preparedness imagination (Heino et al., 2022) used in this study confirms that an investigation of the epistemic work done in relation to preparedness efforts helps to reveal vulnerabilities of the preparedness regime. The thesis also advances research on one established part of preparedness – simulation exercises – by presenting a novel kind of exercise, the Policy Operations Room (POR), as a way of institutionalising the use of imagination in preparedness.

In answering the second research question on broadening the scope of authorities' preparedness imagination, the thesis has posited several policy recommendations for authorities to consider in their preparedness work (see also Table 3 in Chapter 4.2). For example, efforts should be taken to develop generic planning that allows for flexibility in new situations. However, authorities should also critically evaluate the usefulness of historical analogies and assumptions that form the basis for such planning. Preparedness practices should include different forms of collaboration across sectors and with diverse actors to better address future socio-ecological crises. Authorities should acknowledge that no single sector, such as the traditional security sector, can adequately prepare for systemic and transboundary threats on its own. The comprehensive security model should stimulate discourse across sectors and organisations on what security and preparedness entail. Furthermore, clarifying responsibility for and coordination of transboundary crises might prove useful. Scenarios that guide preparedness efforts should be devised and explored in a multidisciplinary manner. Expertise and policy advice must be comprehensive and broad-based in nature, and especially environmental expertise needs to be integrated into decision-making processes as a means of acknowledging systemic threats and vulnerabilities. The chronicity of crises needs to be considered – both by operational and political actors – because planned responses might only work for a particular phase of a crisis. Strategic planning and analysis of how urgent decisions affect the long-term capacity of critical systems to deal with crises should be a part of preparedness planning. Finally, the POR exercises could help authorities in exploring uncertainty related to socio-ecological crises and in practising improvisation. They test different actors' planning assumptions in a collaborative setting and help them consider a longer time frame and the chronicity of crises – thus reimagining crisis management in the Anthropocene. The PORs can be taken as opportunities to feed the feeling of uncertainty, which can help counter the illusion of being in control. The exercises have been implemented in Finnish cities, but they can be replicated in other contexts to broaden the preparing authorities' epistemic boundaries with respect to how they propose responding to socio-ecological threats.

I suggest that delving into the current preparedness exercises and their possible unwanted effects would be a fruitful area of future research. When the exercises focus on shocking but short-term crisis scenarios, they might diminish the possibilities of detecting creeping crises that do not readily fit authorities' established ideas about crises. Devising exercises that could truly shake the illusion of being in control, perhaps by engaging the participants emotionally, like in the latest versions of POR, could be one future direction (see also Ekengren, 2024). Future studies could also explore how to best convert the POR framework into a decision-making instrument, since one of the key current challenges is being able to make coordinated decisions with a sense of environmental urgency that can at

the same time allow space to cope with decadal-scale path dependencies (Hukkinen et al., 2022). Also, since this thesis has only focused on Finnish authorities' preparedness imagination and its epistemic boundaries, I suggest that further comparative research would be valuable, for example research on how the EU guidelines (e.g. Poljansek et al., 2021) regarding the formulation of national risk assessments influence national preparedness imaginations of authorities in different countries.

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