
City Government Innovation for Complex Emergencies: Conceptual Framework and Methodology

*City Government Innovation (CGI) Lab | Research Studio 01 ‘CGI for Emergency Governance’
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Abstract. This scoping paper presents the objectives, conceptual framework and methodological approach of the City Government Innovation (CGI) Lab Research Studio 01, ‘CGI for Emergency Governance’, hosted by LSE Cities at the London School of Economics and Political Science as part of the Bloomberg LSE European City Leadership Initiative (ECLI). It highlights the changing risk landscape for city governments, which requires innovation in how they prepare for and manage complex emergencies. A key innovation that this study examines is the introduction of risk registers, synoptic meta-risk management frameworks that combine risk assessment and management to support overall oversight and internal control. Cities are increasingly using risk registers to imagine potential future crises, identify the risks of greatest concern and consider mitigation strategies. The paper highlights the research gap in exploring city government innovation in this area, describes strategies for future research, and points to some early findings, based on desktop research and a survey of ECLI Cohort 01 cities.

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1 Introduction

Cyber-security shutdowns, disruption caused by drones, sabotage resulting in prolonged critical infrastructure disruption, flash floods of unknown proportions – the contemporary emergency landscape poses considerable challenges for city governance. It calls for innovation at the city government level, as the structures and systems traditionally used to deal with risks and crises are not well suited to the emerging new emergency landscape (Lodge 2025). A fundamental rethink is needed – one that, this research argues, is best understood by working alongside the city governments attempting it.

This research is dedicated to the study of city government innovation (CGI) in response to the evolving emergency and risk landscape in European cities. It investigates institutional change and innovation triggered by extreme crises, risks and uncertainties, and, in a subset of partner cities, works alongside municipal counterparts in longer-term living labs to co-produce and stress-test upgrades from conventional risk registers to integrated risk and emergency governance instruments. The research thus combines comparative-diagnostic work across a broader set of European cities with a generative-experimental track in five partner cities, on the premise that the conditions for successful CGI become visible most clearly when innovation is enacted, not only described.

This research therefore focuses on innovation in the ways in which city governments prepare for crisis and emergency. Crises cause significant, often irreversible harm and challenge confidence in governance arrangements that were supposed to provide safety. Preparing for crisis calls for a reassessment of our understanding of risks in terms of their impact and probability as well as a greater appreciation of non-linear emerging issues associated with high degrees of uncertainty. Addressing this emerging landscape of emergency requires addressing and updating our understanding of what is understood as ‘known risks’, ‘known unknowns’ and ‘unknown unknowns’. It also calls for forms of research that move beyond observing innovation after the fact and engage directly with city governments as they attempt to upgrade their instruments of risk and emergency governance.

Our overarching research question is ‘How does city government innovation connect with new demands for emergency governance in the face of an emerging new world of crisis, risk and uncertainty?’ This overarching question allows this study to explore transformative change requirements for innovation. To do so, the overarching research question will be addressed through a set of sub-questions:

- To what degree is preparing for governing complex emergencies associated with City Government Innovation?
- How are emerging risks detected and what kind of emergencies are differentiated?
- What kind of venues exist for the identification, analysis and responses to different types of risks (inside and beyond city governments)?
- How are emergency governance responses resourced and monitored in cities? What understanding of capacities underpin cities’ efforts of developing emergency governance provisions.
- Does context matter? How do prior experiences in crisis and emergencies affect the ways in which cities prepare for future emergencies? Are there differences in term of city status, whether that is in terms of constitutional status, or political/administrative significance?
- To what extent does a greater emergency exposure of cities result in crisis governance rigidity as opposed to crisis governance experiment and innovation, including under conditions where experimentation is deliberately supported through structured engagement with the research?
- Under what conditions, and through what mechanisms, can existing city-level risk registers be upgraded into integrated risk and emergency governance instruments, and what does the attempt itself reveal about the enabling conditions and limits of CGI?

These questions will be explored with a particular emphasis on so-called ‘risk registers’ - the kind of synoptic meta-risk management frameworks that combine risk assessment and management to support

overall oversight and internal control. Such frameworks have become increasingly popular in private and public organisations and have been advocated by international organisations. The research treats them both as objects of comparative study and as institutional instruments whose upgrading toward integrated risk and emergency governance can be deliberately attempted and observed.

This paper first introduces the research landscape that underpins the proposed investigation, then moves to presenting a conceptual framework that situates this study in the wider context of CGI in complex emergencies. The methodological section sets out a two-track design combining comparative case analysis across 15–20 European cities with longer-term living labs in up to five partner cities, where embedded researchers work with municipal counterparts to co-produce and test register upgrades over the four-year project window. The final substantive section shares early and preliminary findings from the ECLI Cohort 01 Cities. Research Landscape

Despite attracting considerable attention on their own terms, there is a surprisingly limited literature that focuses on city government innovation in the context of emergency management (Wolbers et al., 2021). The latter – also associated with the fields of risk and crisis management – has largely focused on the national or transnational level or on (the aftermath of) disasters to respond to the emerging diagnosis that crises are transboundary, cutting across jurisdictional and other boundaries. The former literature on city government innovation has largely focused on reform in wider public services.

This section sets out the intellectual canvas for exploring city government innovation in emergency management. It introduces the key themes of city government innovation (2.1) and complex emergencies (2.2). It then highlights the need for systematic research in governance arrangements for complex emergencies at the city government level (2.3) by focusing on the introduction of risk registers and related crisis management tools (2.4). To underpin our argument for the systematic research into this area we also present, in section 2.5, the results of initial systematic literature searches.

1.1 City Government Innovation

City government innovation – and related labels – have attracted considerable attention in recent years (Rode and Anheier 2025). Cities have been increasingly recognised as central focus not just for experiencing the challenges of the 21st century, but also for providing problem-solving capacity. The focus on innovation places attention on ‘who, what, when and how’ questions (Black 2005). In this study, we focus on the adoption of one particular type of innovation – the use of risk registers to synoptically manage risks at the city level – and the extent to which the introduction of such an approach becomes a source of innovation in itself.

Drivers for CGI can be identified from a range of sources. One source might be strong demands put forth by the domain of politics. While ‘keeping citizens safe’ is a traditional core function of all levels of government, coping with uncertainty and addressing emergencies have become a central, and more visible, part of the requirements for city governments. Even though the local level has traditionally represented the first line of defence in emergency management, coping with disaster in an uncertain world has become increasingly salient, placing growing demands on politicians who, in turn, require innovative responses from their administration.

Change in political leadership is also seen as an essential driver for innovation. The arrival of a new administration is expected to lead to different approaches to public sector reform, especially when elected on a platform of replacing an administration deemed incompetent in handling crisis and emergency, or where previous administrations are alleged to have engaged in corruption that contributed to disaster or to an unpopular disaster response.

However, city government innovation is not solely the result of political requirements. An acute crisis can provide the context for innovation. Acute crises (or repeat incidents) can trigger a potential policy punctuation in which existing approaches are deemed no longer appropriate, leading to de-institutionalisation (Hood and Lodge 2002). Accordingly, the experience of an acute crisis provides scope for a fundamental revision of existing policy narratives in the context of a (at least temporary) replacement of existing policy communities. Experiences such as the financial crisis or a pandemic

represent such ‘punctuations’ (or ‘policy windows’) during which new communities are formed and different policy approaches established. However, whether such punctuations exist in the same way at the city government level requires further investigation. Whereas most accounts point to the immediate effects of a crisis or an event that encourages change and innovation, more indirect effects are also likely. For example, events such as the UK’s withdrawal from the European Union required considerable policy reframing; equally, changes in policy direction signalled by or originating from other countries, such as the United States, may require policy adjustment, leading to innovation.

Changes in context also alter the balance of benefits and costs of specific governing arrangements, encouraging government innovation. The rise and fall of different tax regimes might be seen in such light. Similarly, the emergence of new technologies may be seen as increasing the scope for government innovation. For example, the ways in which the contemporary world of digital government may make use of data processing capacity that was unknown to previous generations and enable more fine-grained and timely predictions.

1.2 Complex Emergencies

The world of emergency management has been exposed to multiple vulnerabilities; defined, by some, as polycrisis, which are interconnected crises with cascading effects (Henig & Knight, 2023). New technologies and types of threats challenge existing organisational competencies – fire services are, for example, ill-equipped to engage with a rise of cyber-security concerns. Changing risk profiles, due to, for example, climate change, require innovation in terms of understandings of probabilities and impacts. Examples include recent extreme weather events leading to devastating flooding or fires. New areas of uncertainty emerge where impact and probabilities are difficult to estimate (e.g., recent discussions of ‘climate whiplash’ facing cities). In addition, we are dealing with an unprecedented period of ‘ignorance’ in which emerging issues expose tightly coupled social systems to potential complex emergencies.

In short, therefore, any city government is faced with a reconsideration of its risk and emergency landscape, in view of:

- ‘Known knowns’ with a significant increase of the severity and/or probability of existing risks (‘risk’),
- ‘Known unknowns’, which include risks with unknown probabilities and impacts, but relative certainty about underlying mechanisms (‘uncertainty’), and
- ‘Unknown unknowns’ – emerging (complex) emergencies for which interrelationships between policy domains are not understood, such as how climate relates to forced migration (‘ignorance’).

The focus on complex emergencies points to the lack of comprehension regarding causal relationships, triggers and consequences, making estimations regarding probability and impact near-impossible. For example, the impact of the climate crisis on different social systems is recognised, but there is little understanding of the interdependencies and their effects (Boin 2019). Most of all, the growing probability and impact of climate-related events is likely to generate further migration pressure, leading to growing demand on housing and other public services. In other words, crisis and emergencies cascade across domains and territories. In such a context, the advocacy of synoptic tools of risk management seems to offer a perfect fit to the diagnosed problems of complex emergencies and crises.

1.3 Governing Complex Emergencies at the City Level

In view of the diagnosis of growing ‘turbulence’, some scholarship has called for a growing interest in government ‘robustness’ – responding, in part, to growing complexification in understandings of ‘resilience’ (Ansell et al 2023, Boin and Lodge 2016). While the city government level is central to any response to the changing world of complex emergencies (Rode et al 2024); there is a gap in our understanding as to how city governments seek to enhance their capacities for systematic crisis preparation. Existing research ranges from an interest in security related innovations in view of terrorist attacks to a growing interest in societal forms of resilience in emergency management,

placing the role of city and other levels of government as that of an enabler, co-provider and mediator rather than as a sole provider of emergency management (Arrieta & Davies, 2024; Ahrens & Ferry, 2020). Despite the central importance of the local level, research on public crisis management tends to concentrate on national institutions and centralized civil protection systems (Kuipers et al., 2015). A focus on city-level governance is important because even within similar institutional contexts, local crisis governance differs based on the interests, agency and framing strategies of key actors (Baldersheim & Haug, 2024; Bouckaert et al., 2020).

More generally, the world of crisis management is said to have witnessed considerable professionalisation over the past three decades, with a growing formalisation of crisis management functions across systems of government, facilitating (at least potentially) integrated, cross-sectoral, and adaptive strategies (Christensen et al., 2016). While such professionalisation has been noticeable in terms of organisational change (especially in terms of the emergence of dedicated crisis units across administrative systems), there has also been change in the ways in which risk and crisis management are being understood: there has been a growing fusion of the worlds of risk and crisis management. The former was reserved to the world of detection and processing under ‘normal’ times, whereas the latter was particularly concerned with the world of emergency and uncertainty. We are witnessing a merging of these two worlds; the world of crisis management is adopting the tools of detection from the world of risk, whereas the world of risk management increasingly also includes an interest in ‘failing’ and ‘failure’.

Similarly, the world of emergency management, the design and operation of institutional arrangements dealing with threats to the survival of social systems, has become increasingly close to the worlds of risk and crisis (and will, in this research, therefore be treated as the same) (see Cabane and Lodge 2024). Most of all, and especially at the city level, the traditional distinction between local legal competence for emergencies, and the delegated functions of dealing with civil defence matters has become increasingly challenged. As such, therefore, de facto responsibilities for emergency management have become increasingly blurred with those traditionally associated by civil defence. While in both areas, city governments have been critical, traditionally, the area of emergency management has been within the constitutional remit of local authorities, whereas civil defence tasks were regarded as ‘delegated’ function. Indeed, the increasing emphasis on the transboundary nature of risk and crisis undermines established approaches that are solely focused on formal jurisdictional boundaries.

In view of such a changing landscape, this research explores one central theme in government innovation, namely the ways in which risk has been used as programme and technology to strategically prepare for and learn from emergency.

1.4 Innovation in Technologies of Risk and Crisis Management

A growing reliance on internal controls – ‘risk registers’ – has become a central theme in the contemporary literature on risk and crisis management (Power 2007). Public and private organisation are required to develop synoptic understandings of the threats facing their organisation (see Power 2007). Similarly, there has been a growing expectation on city governments (and governments in general) to formalise and make public their risk registers in view of emergency and crisis management. In other words, city government innovation in emergency governance is no longer just about revisiting traditional crisis ‘stage models’ that fit acute crisis (involving prevention or preparation, mitigation, response, and recovery; see Wolbers et al., 2021; ‘t Hart & Sundelius, 2013; Cronstedt, 2002, or, alternatively, detection, sense-making, decision-making, coordination, meaning-making, communication, and accountability; see TransCrisis 2015).

Risk registers are said to enable city governments to develop a synoptic view of their risk landscape, in order to identify potential threats, provide opportunity to rank risks according to probability and impact, enable discussion of a ‘risk appetite’ and to consider mitigations strategies. The utilisation of risk registers and related technologies allow organisations to imagine potential futures but also enable exercises in internal control (and audit). Conversations surrounding ‘risk appetite’ are likely to be highly problematic – despite much clamour that politicians and bureaucrats should be less ‘risk

averse', being seen as tolerant of certain risks (e.g., having a high-risk appetite) is likely to attract considerable opposition.

These frameworks have diffused from private to public organisations, and the implications of such a 'risk-based' approach towards governing has received growing academic attention, especially also in view of potential organisational biases as well as the potential for accentuating blame-avoidance motivations among organisations. Little attention has been paid, however, to the emergence of risk registers for crisis and emergency management at the city level. Such a gap is even more noticeable as international organisations, such as the Organisation for Economic Co-operation and Development (OECD), have embraced similar approaches towards governing critical risks. Starting with an earlier 9/11-related focus on critical infrastructure, the focus has moved to attention on interdependences arising from transboundary risks. At the heart of these initiatives are calls for tools to facilitate imagining ('foresight') in systematic and cross-organisational ways. Again, such approaches advocate a 'risk register' type approach, requiring continuous evaluation in terms of risk identification and concern with engaged control regarding the appropriateness of mitigation strategies.

1.5 Literature Scoping Review

So far, the discussion has focused on the key themes motivating the research of this research studio. What, however, can we say about the social science literature on these themes? The sections above provide some indication of core themes in the literature on emergency, crisis and risk governance that are central to this study, the extent to which there is any clear, pre-existing research agenda for government innovation for complex emergencies at the city government level is less apparent.

Despite a burgeoning public administration literature on public sector innovation (Criado et al. 2025; Cinar et al. 2024; Chen et al. 2020; De Vries et al. 2016) and wider government modernisation and innovation (Lodge and Wegrich 2014; Sorensen & Torfing 2016), including the city level (da Cruz et al. 2024; Kattel et al. 2025), this work focuses primarily on administrative processes, service delivery, and governance structures, with limited attention to emergency and crisis management. Studies into emergency and crisis management that do analyse urban cases highlight the important role of adaptive and innovative behaviour in such contexts but often treat these as general cases rather than distinctively urban phenomena. Equally, beyond public administration research, other fields such as environmental studies, urban studies, and planning also attend to related themes of fostering innovation in urban resilience, sustainable development, and disaster risk reduction, but often in ways that are largely separate from discussions of government innovation.

To systematically identify research literature on government innovation for complex emergencies at the city government level, this workstream has undertaken provisional literature scoping review work, systematically searching bibliographic databases for relevant published materials.

A fuller explanation of the provisional scoping review work is provided in Appendix A. In brief, a series of searches on 'Web of Science' were conducted to identify papers that collectively addressed (i) government/public sector innovation at the (ii) city government level, and (iii) in relation to crisis, emergency, disaster, resilience or risk management (see Appendix A for more detail on search strategies, search terms, and other procedures followed). This initial search returned a sample of 222 articles, from which 42 papers have been determined to be relevant to this workstream based on abstract screening. Some basic data items for each paper marked as relevant were also recorded, to capture some basic information about the methods used, geographic areas and number of cities studied, and types of crises studied. Tables 1–4 provide an overview.

Overall, the findings of this scoping review suggest the lack of an established and connected field that explores CGI in the context of complex emergency management, and this research studio is well placed to contribute to the development of such a distinct field in the literature.

Table 1: Breakdown of papers by methodological approach*

Method	Count
Qualitative: single case study	18
Qualitative: multiple/comparative case study	11
Quantitative: observational	13
Quantitative: quasi-experimental	0
Quantitative: experimental	0
No method	4
Other method	2

* With the exception of 'NO METHOD', method categories are not mutually exclusive.

Table 2: Breakdown of geographic focus of papers by continent and country (top 10 only)

Continent	Count	Country	Count
Europe	15	USA	7
Asia	14	China	6
Africa	3	Italy	5
North America	7	Indonesia	3
South America	1	UK	3
Oceania	1	Belgium	2
None/unknown	1	Germany	2
		India	2
		Netherlands	2
		Singapore	2

* With the exception of 'NONE/UNKNOWN', continent categories are not mutually exclusive.

Table 3: Breakdown of papers by crisis/emergency type studied * **

Emergency type	Count
Covid-19	13
Routine	8
Non-routine	17
Complex	25

* Aside from the COVID-19 category, emergency categories are based on Rode et al 2024 'Governing complex emergencies at the local level'. A more detailed breakdown is provided in Appendix A.

** Emergency types are not mutually exclusive.

Table 4: Breakdown of papers by number of cities studied

Number of cities	Count
1	19
2-5	5
6-20	1
21-50	3
51-100	1
101+	1
None/unknown	12

These results are provisional and intended to merely give some sense of the scope of the literature identified from Web of Science. Limitations of this approach are discussed in Appendix A, along with some further options for future work.

2 Conceptual Framework

As noted, in view of the rise of risk as a central concept in organisational life (Black 2010), this research studio focuses on the ways in which the design and management of risk registers is organised across city governments. As noted, focusing on risk has been a central theme in the world of corporate governance, linked to themes of internal audit. In parallel – and representing one further example of a read-across from private sector reform ideas to the public sector – in recent years there has been an interest in identifying contingencies, risks and vulnerabilities at the national, regional and local levels of government. Risk registers represent a type of government innovation, requiring strategic coordination, standard-setting, updating and detecting, as well as resource calibration. Indeed, they are supposed to be closely linked to learning from experience. Studying the introduction and utilisation of risk registers as an example of city government innovation therefore provides for important insights of how innovation can succeed (or not) in adjusting cities to the emerging emergency landscape.

At the same time, city government innovations are associated with unintended consequences. This studio is therefore also interested in exploring vulnerabilities and blind spots (Bach and Wegrich 2019, Lodge 2019). To what extent are, therefore, potential vulnerabilities (known weaknesses of certain organisational approaches) and blind spots (the non-seeing the not-seeing) acknowledged in innovative ways in organising for emergencies.

This section begins by situating our work in the wider context of research on risk management and CGI in emergency management, building on earlier work (3.1- 3.3). We then move to a discussion of how this studio will explore innovation in the context of risk registers.

2.1 Key Definitions

For the purposes of this study, risk registers are defined as *risk-based technologies that require organisations to develop a comprehensive and synoptic view of their risk landscape, enabling them to identify potential threats, provide opportunity to rank risks according to probability and impact, discuss ‘risk appetite’ and consider mitigations strategies.*

Our definition follows the ‘risk management plan’ definition by the ISO ([ISO 31073:2022\(en\), Risk management — Vocabulary](#)), in including ‘scheme within the risk management framework specifying the approach, the management components and resources to be applied to the management of risk’. Risk registers, as understood in this study, include both a comprehensive risk assessment (a record of the identified risks) and risk management planning (information on how risks will be addressed).

This definition follows the frameworks put forward by international organisations. As noted, there has been a notable shift in crisis management towards increasing emphasis on the proactive management of risk in crisis prevention and preparedness work. The UN Sendai Framework, for example, notes that ‘many commentators have identified the most significant shifts as a strong emphasis on disaster risk management as opposed to disaster management’ (2015, p.5). At the EU level, there is a push for member states to produce national risk assessments (European Commission, 2019), while the OECD has similarly recommended such measures as an important element in any strategy for governing critical risks (OECD, 2014; 2017).

Comprehensive risk assessments are now embedded in the civil contingency and emergency planning regimes of many European countries, and in several cases extend beyond the national level to regional and city-level assessments. In the United Kingdom, for instance, London and other local areas are required to publish their own community risk registers, intended to be read alongside a national risk register. In Sweden, public organisations, including municipalities, are required to provide for ‘risk and vulnerability plans’ that are regularly assessed; Germany too has moved towards a risk-based approach.¹ Such a shift in attention towards a more comprehensive risk management approach signifies a move away from existing siloed operational emergency management plans. Politically it highlights the growing need for executive leadership to be engaged in crisis and emergency management preparation. For the world of crisis and emergency management as such it reflects the need to move beyond existing approaches given changing risk landscapes.

2.2 Emergency Governance

The literature on CGI in the context of complex emergencies has provided a range of critical insights. It has highlighted the importance of understanding emergency governance both in terms of building blocks and as a process. This section situates this research studio's interest within that body of work. This study explores risk registers as a 'directed' CGI in the sense that it represents a 'tool of imagination'. At the same time, risk registers also provide for undirected CGI as part of wider responses to acute crisis. In such cases, risk registers may provide additional resource in the response to crises, and they also may witness updating in view of the experience of actual crisis management.

The main focus of the research is on the directed CGI, using risk registers as an anticipatory technology, requiring imagination to address uncertainty. At the same time, the research will make use of learning from moments of crisis, in particular questioning the role of anticipatory devices in supporting the actual management of emergencies, and how insights gleaned from such crises feed back into the modification of risk registers.

Table 5 presents an overview of emergency governance building blocks as a starting point for analysing to which building blocks risk registers might contribute.

Table 5: Emergency governance building blocks

Source: Authors

1. Legal and Normative Foundations	The constitutional, legislative, and regulatory basis that authorises and constrains emergency action – emergency powers legislation, civil protection laws, international obligations (e.g., Sendai Framework, IHR), and the rules governing how authority is exercised during crises.
2. Institutional Architecture	The organisational structures responsible for crisis governance at all levels – dedicated agencies (e.g., civil protection authorities, emergency management agencies), coordination bodies (e.g., crisis committees, situation centres), and the allocation of roles and responsibilities across levels of government and sectors.
3. Risk Knowledge and Information Systems	The capacity to understand, assess and communicate risk – encompassing risk assessments, risk registers, hazard mapping, monitoring and surveillance systems, early warning systems, and the data infrastructure that underpins evidence-based decision-making.
4. Policy and Strategic Frameworks	The strategies, plans and policies that guide action – national DRR strategies, emergency/contingency plans, continuity of government plans, recovery frameworks, and their alignment with broader development and security policies.
5. Coordination and Cooperation Mechanisms	The arrangements that enable coherent action across actors and sectors - horizontal coordination (cross-agency, civil-military, public-private), vertical coordination (local-national-international), and the protocols, agreements and platforms that facilitate these.
6. Resources and Capabilities	The human, financial, material and technological assets available - trained personnel, emergency funding mechanisms, equipment and supplies, mutual aid agreements, and the systems for mobilising and deploying these resources.
7. Communication and Public Engagement	The systems for crisis communication, public warning, information sharing, and the broader engagement of communities and civil society in risk governance – encompassing both top-down communication and participatory approaches to build trust, enhance transparency and overall legitimacy of emergency actions.
8. Accountability and Learning Mechanisms	The oversight, review and improvement functions – after-action reviews, parliamentary oversight, audit regimes, performance monitoring, lessons learned processes, and the feedback loops that drive continuous improvement.
9. Financial and Risk Transfer Instruments	The mechanisms for financing preparedness, response and recovery, and for transferring and distributing risk - emergency funds, insurance and reinsurance schemes, catastrophe bonds, and social safety nets.
10. Critical Infrastructure and System Resilience	The resilience and redundancy of essential systems, including healthcare, energy, water, transport, digital networks, and supply chains, that enable societies to function during and after crises.

As a form of meta-management, risk registers are likely to emphasise the broader institutional framework in which emergency responses are set rather than detailed operational plans. Accordingly, we would expect risk registers to speak particularly to questions of legal and normative foundations,

the broader institutional architecture, the kind of risk knowledge and information system that underpins the detection, analysis and responses to diagnosed risks, as well as broader policy and coordinative frameworks. We would also expect, as part of the risk mitigation and management activities (in addition to internal control functions), to be a strong focus on resources and capabilities. In contrast, we would expect less of an emphasis on accountability, communication and broader financial risk transfer instruments.

Emergency governance stages

Table 6 provides an overview of the well-established ‘stages’ of emergency governance.

Table 6: Emergency governance stages

Source: Authors

	Stages	Components
Preparation	1. Risk Identification & Assessment	Identifying hazards, threats, and vulnerabilities Conducting risk assessments and scenario analyses Mapping interdependencies (e.g., critical infrastructure) Establishing and maintaining risk registers
	2. Prevention & Mitigation	Developing and enforcing regulations and standards Investing in structural measures (e.g., flood defences, building codes) Implementing non-structural measures (e.g., land-use planning, public education) Risk transfer mechanisms (e.g., insurance)
	3. Preparedness	Developing emergency plans and procedures Building institutional capacity and coordination structures Training personnel and conducting exercises Pre-positioning resources and establishing early warning systems Establishing communication protocols
	4. Early Warning & Anticipation	Monitoring risks and emerging threats Triggering alert levels and escalation procedures Activating anticipatory action (e.g., pre-emptive evacuations, pre-arranged financing) Sharing intelligence and situational awareness across stakeholders
Actioned Emergency Governance	5. Response	Activating crisis management structures and command systems Coordinating operational response across agencies and levels of government Deploying resources and personnel Managing crisis communication and public information Making time-critical decisions under uncertainty
	6. Recovery & Reconstruction	Conducting damage and needs assessments Restoring essential services and infrastructure Providing support to affected populations Transitioning from emergency to longer-term recovery governance “Building back better” to reduce future risk
	7. Learning & Adaptation	Conducting after-action reviews and evaluations Identifying lessons learned and best practices Updating policies, plans, and procedures Strengthening institutional memory Feeding insights back into risk assessment (restarting the cycle)

The role of risk registers is likely to be mainly at the preparatory stage. At the same time, by exploring the actual experience of crisis, the study is interested in the ways in which learning and adaptation does take place, and it questions the extent to which preparatory processes involving risk registers inform – directly or indirectly – actual crisis responses.

Emergency governance instruments and tools

Finally, Table 7 provides an overview of standard emergency governance instruments and tools.

Table 7: Emergency governance instruments and tools

Source: Authors

Tools	Examples
Legal & Regulatory Frameworks	Emergency powers legislation (e.g., states of emergency declarations) Civil protection laws Regulatory standards and codes (e.g., building codes, safety regulations)
Information & Decision Support	Early warning systems Predictive analytics and AI-enabled emergency resource optimisation Common operating pictures / situational awareness platforms Intelligence sharing networks Public alert and notification systems (e.g., EU-Alert, FEMA alerts)
Institutional & Coordination Mechanisms	National crisis management centres / situation rooms Interagency coordination bodies (e.g., COBRA in the UK, NSC in the US) Civil-military coordination frameworks Incident command systems (e.g., ICS, JESIP) Multi-level governance arrangements (local-regional-national-international)
Policy & Strategic Instruments	National disaster risk reduction strategies National security strategies Critical infrastructure protection policies Resilience strategies and frameworks Sendai Framework national action plans
Planning & Preparedness Tools	National emergency/contingency plans Crisis communication plans Continuity of government plans Evacuation plans Exercises, drills, and simulations
Accountability & Oversight Mechanisms	After-action reviews and lessons learned processes Parliamentary oversight and inquiry commissions Audit and inspection regimes Performance benchmarks and indicators Compliance monitoring frameworks
Financial & Resource Mechanisms	Emergency funding mechanisms (e.g., EU Solidarity Fund) National disaster funds / contingency reserves Mutual aid and resource-sharing agreements Procurement frameworks for emergency supplies
International & Multilateral Tools	International disaster response conventions Humanitarian coordination clusters (UN OCHA system) EU Civil Protection Mechanism Bilateral and multilateral assistance agreements

By their very nature, risk registers are instruments of information and decision support. However, depending on their degree of comprehensiveness, they can also affect the ways in which other tools are framed and understood, primarily legislative and regulatory frameworks, institutional coordination mechanisms, policy and strategic instruments, as well as planning tools. However, we would expect other central instruments of emergency governance, such as accountability mechanisms, financial instruments as well as linkages to international frameworks to feature in other venues and documents.

Approaching the study of CGI in emergency management through the lens of risk registers raises further definitional questions. For one, in assessing the type of documents that might be used by city governments to develop a synoptic understanding of their risk landscape and related risk management responsibilities, the analysis will distinguish between those approaches that are risk-based, therefore relying on assessments of probability and impact, and those approaches that merely note hazards, for example.

2.3 Link to City Government Innovation Framings

Figure 1 presents the City Government Innovation logic. We position complex emergencies as part of CGI Antecedents under the ‘opportunities/problems’ dimension. Related CGI core activities, including the establishment of risk registers, are considered CGI actions. Public goods provision cuts across a multi-domain increase in preparedness, resilience and adaptability.

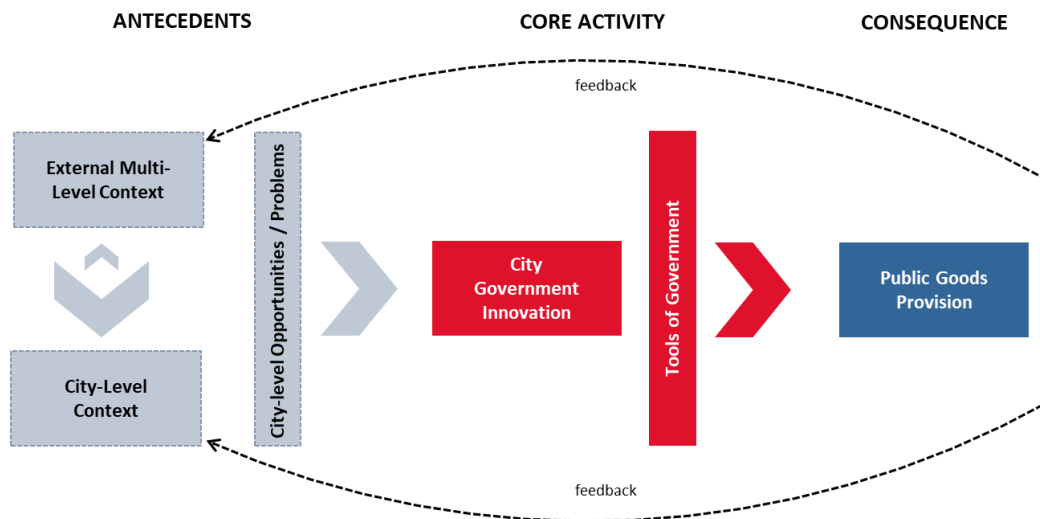


Figure 1: Simple Conceptual Framework for City Government Innovation

Source: Rode and Anheier 2025

Table 8 places the different institutional building blocks of the management of complex emergencies in the wider context of the six CGI action types proposed by Rode and Anheier (2025). The research will explore the extent to which the design and operation of risk registers can be linked to CGI action types. However, given the focus of this research, we anticipate a higher degree of relevance to actions in terms of city administrative and organisational innovation than, for example, democratic and civic innovation. Similarly, we expect risk registers to speak to new forms of digital or data-driven innovation, but, as meta-management tool, to have at most an indirect impact on city services, e.g., emergency services. We classify the likely relevance in terms of high (H), medium (M) and low (L).

Table 8: CGI action types (vertical) and associations with prominent emergency governance building blocks (horizontal)

Source: Authors

CGI action types	1. Legal and Normative Foundations	2. Institutional Architecture	3. Risk Knowledge and Information Systems	4. Policy and Strategic Frameworks	5. Coordination and Cooperation Mechanisms	6. Resources and Capabilities	7. Communication and Public Engagement	8. Accountability and Learning Mechanisms	9. Financial and Risk Transfer Instruments	10. Critical Infrastructure and System Resilience
(1) Urban democratic and civic innovation	M	M	M	M	M	M	L	M	L	L
(2) City administrative and organisational innovation	H	H	H	H	H	H	M	H	M	L
(3) Urban finance and procurement innovation	L	L	L	L	L	L	L	L	L	L
(4) City-level digital and data-driven innovation	M	M	H	H	H	M	L	L	L	M
(5) Urban policy and regulatory innovation	H	H	H	H	H	H	M	M	L	M
(6) City service innovation	M	M	M	M	M	M	L	M	L	M

2.4 Researching Risk Registers

By focusing on the design and operation of risk registers (and related initiatives to give cities a synoptic perspective of crises and complex emergencies) we are examining how city governments are proactively innovating to be better prepared in a changing emergency risk landscape. We are also interested, however, in how well risk registers perform in acute crises. Do they ‘matter’ during a state of emergency? Have they proven, in some contexts, to be little more than ‘fantasy documents’, or have they served as useful resources for effective crisis management at the city level – whether or not this was intended?

The introduction to this paper laid out the key questions being investigated by this studio. Here we delve deeper into some of the main issues of interest in the empirical research.

How do cities detect emerging threats, and how does cities’ experience with crises affect cities’ interest in risk registers?

As the emergency landscape is changing, we are interested in how cities assess and detect threats. In particular, the study investigates questions such as: What mechanisms for detection do city governments use? How are they linked to risk monitoring activities at different levels, from the national (transnational) to sub-municipal levels? How are they linked to the activities of different emergency services? Threat detection work by a city is likely to require considerable coordination in a situation of often dispersed authority, which novel technologies might facilitate. We are also interested in the extent to which the frameworks adopt an explicit risk language.

Another area of focus is the influence of experience. Do cities that are highly vulnerable to particular risks, or that have already experienced a crisis, exhibit a greater interest in threat detection? How do they learn from experience in developing risk registers? A common issue noted by scholars is that risk regulation is often driven by public opinion and can thus be hyper-responsive to ‘last month’s crisis’. How can innovation help cities avoid such over-excited responsiveness to the latest crisis? More generally, how does the experience of acute crisis – directly or through other cities, such as peers in professional networks (e.g., CGI) – affect this work?

How do cities decide which threats to include or omit from risk registers, in what venues are those decisions made, and what standards are applied in those decisions?

The move towards risk registers as a central aspect of managing systems and organisations reflects on a broader trend towards ‘enforced self-regulation’. The core idea is to encourage self-reflection by the organisation(s) responsible for identifying and managing risks. Regulatory systems can encourage such self-reflection as ‘motivated compliance’, supported through capacity-building.

To better understand innovation in how cities assess risks, this study examines the standards applied and the venues in which decisions are made on which risks to address in the risk register (and which to ignore). We consider not just who innovates, but also who is responsible for the innovation. In terms of venue, we observe, for example, that some risk registers are centralised at the city hall; some are prepared jointly with emergency services, and some are coordinated by emergency services. Each one of these models has its own advantages and disadvantages, and this research studio explores the rationale for each model and how institutional vulnerabilities are compensated for. Indeed, the focus will also be on how information is fed back and leads to discussions about updating of the risk register or whether we are observing a ‘fossilisation’ of these documents in that their initial formulation generates some form of placation effect (until another acute crisis hits).

How are emergency governance responses resourced and monitored?

Questions of how to bring systems into their desired state require not just understanding what is desired and whether current operations fall short; they also require resources to address diagnosed or experienced shortcomings. Risk registers are central instruments to assess states of preparedness. The question then is how risk registers ‘matter’ in the management of an acute emergency at the city level, and how such experiences feed back into the updating of the risk register.

In view of existing silos and professional worldviews as to the ‘way of doing things’, risk registers have the potential to be regarded as irritants. Given this, how do city governments seek to make risk registers ‘stick’ across the dispersed world of emergency management? What kind of resources (legal, informational, financial or organisational) are being used to address diagnosed shortcomings?

In sum, on one level, this research examines the day-to-day operations of risk registers as a central mechanism of control and coordination of city government emergency management. At the same time, on a second level, it analyses the ways in which these systems perform in actual emergencies, and how these emergencies feed into learning. In particular, it assesses the staying power of formal structures of emergency management after the acute uncertainty of an emergency, and compares ‘official’ learning in the aftermath with more informal changes in behaviour across and within organisations involved in responding to emergencies. Table 9 below summarises some core questions this study seeks to answer.

Table 9: Exploring risk registers

Source: Authors

Information-gathering	Standard-setting	Behaviour modification
• What ‘techniques’ for learning are being adopted? • Which issues are ‘detected’ in review activities?	• What standards exist to decide on degree of lesson-learning (none, service-level, system-wide)? • What standards of updating exist?	• How did risk registers inform overall and service-level responses to emergencies? • How does systematic ‘learning from crisis’ influence organisational learning in contrast to informal mechanisms?

3 Methodology

This section first describes how our empirical cases were selected, then our approaches to data collection and analysis. The research design operates on two complementary and mutually informing tracks. The first is a comparative-diagnostic track, drawing on 15–20 European cities to map variation in risk landscapes, risk registers and emergency governance practices, and to generate a typology of CGI approaches. The second is a generative-experimental track, working with up to five partner cities through longer-term living labs in which embedded researchers co-produce, with municipal counterparts, upgrades from conventional risk registers to integrated registers and emergency governance approaches. The diagnostic track identifies promising candidates, patterns and hypotheses; the experimental track tests, refines and extends them under real institutional conditions. Findings flow in both directions across the four-year period of the study.

3.1 Case Study Identification

The study will use a sample of European cities selected based on criteria of i) size, ii) status (national/regional capitals vs other cities), iii) socio-economic status, iv) exposure to prior emergencies, v) risk landscape, and vi) constitutionally defined emergency autonomy.

Building on an initial desk-based analysis of 30 cities, we will focus on 15–20 cases in more detail. Given the multi-cohort nature of CGI, this means that we will work with about five cities per year, focusing on cities that, in survey responses, suggest a high degree of engagement in tools of risk and crisis management. The selection criteria, in turn, are meant to enable the study to examine different dimensions that are likely to affect the extent to which cities engage in CGI around risk management:

- **Size:** We expect size to matter both for the availability of underlying critical infrastructure and in terms of complexity.
- **Status:** We expect that the degree to which cities have discretion to innovate will directly depend on the degree to which they are tied to national emergency frameworks. Accordingly, we expect layering of sometimes reinforcing, sometimes contradictory tendencies. In places such as national capitals, the national significance of the city – in political or economic terms –

may limit locally led innovation. Regionally important cities may have more resources and organisational ‘slack’ to engage in cross-cutting and systemic conversations about risk registers.

- **Fiscal status:** We expect more prosperous cities to have more resources that they can deploy to innovate in emergency management. In contrast, we expect that in cities with significant fiscal constraints, the lack of resources and capacities may discourage an interest in CGI.
- **Exposure to prior emergencies:** Research on crisis frequently hypothesises that crisis management is likely to focus on the ‘last crisis’ rather than perform anticipatory analysis. The research will focus on how, and to what extent, cities seek to avoid that pitfall.
- **Risk landscape:** We expect that the diagnosed vulnerability in terms of risk landscape, as expressed by commercial and non-commercial providers, as well as the potential presence of high hazard industries (harbours, chemical plants, etc.) shape the development of risk registers at the city level. The underlying expectation here is that the higher the stress on city governments in view of threats, the greater the difficulty in organising systematic crisis management approaches at the city level. Desk-based research and access to existing datasets (e.g. insurance data, ecological risk forecasts, socio-economic projections, demography indices, etc.) will be used to establish context specific risk landscapes. These are contrasted with public information on risks and used to identify overlapping risks (for example, climate risk profiles: <https://european-crt.org/index.html>). It allows for the identification of potential processes of diffusion and their sources (‘isomorphism’).
- **Constitutionally granted level of autonomy in emergency management:** While there are common crisis management doctrines (first line defence at the local level, escalation to higher levels of government where initial lines are seen to be ‘overwhelmed’), city governments that have the autonomy to develop their own emergency management plan may be likelier to engage in CGI. At the same time, the interaction between de jure constraints and de facto discretion in planning for emergencies might be expected to lead to particular forms of CGI.

From within the 15–20 comparative cases, up to five cities will be selected as living lab partners (see Section 4.5). The selection of lab cities applies the six criteria above along with four filters specific to the experimental track:

- **Institutional appetite for change:** identified through survey responses and initial interviews suggesting active reflection on the limits of current risk-register practice, rather than well-developed but stable arrangements;
- **Senior sponsorship:** a named champion at the level of deputy mayor, chief resilience officer or head of civil protection willing to host the work and ensure cross-departmental access;
- **Cross-departmental willingness:** a credible commitment to involve at least three relevant departments (typically emergency planning, infrastructure, public health, and strategy or finance), since the move from siloed registers to integrated registers is fundamentally a horizontal-coordination problem;
- **Complementarity within the lab cohort:** the five labs together should span variation in size, constitutional status, and pioneer-versus-follower classification, so that the cohort illuminates how context shapes what ‘integration’ can mean in practice.

A formal memorandum of understanding or letter of engagement will be agreed with each lab partner city at the outset, setting out access, confidentiality, role of the embedded researcher, and shared outputs.

The identification of the most relevant case studies based on the criteria above and subsequent analysis of emergency-induced CGI will be supported by the CGI Observatory and follows the five distinct approaches presented in Figure 2 and described below.

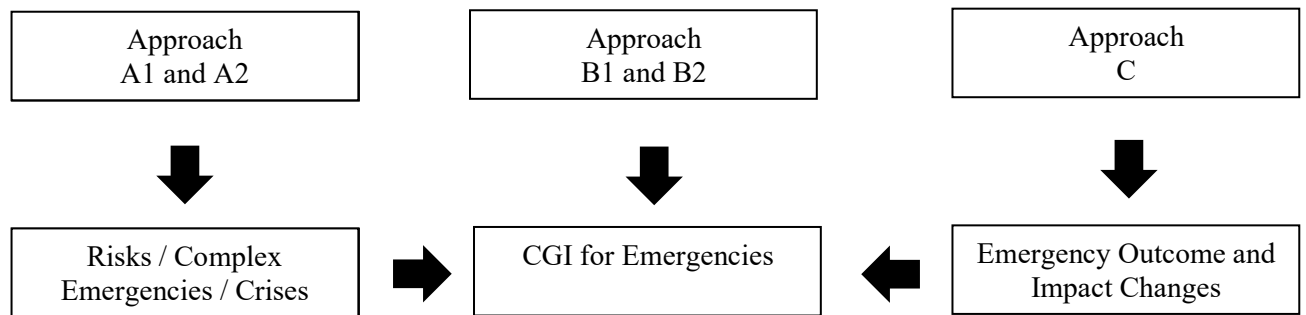


Figure 2: Adjusted CGI Observatory approaches for identifying city cases

Source: Based on Rode and Anheier 2025

Approach A1: Based on the (self-)reporting of a major complex emergency, the study will explore whether the experience of emergencies has led to CGI – in particular, whether that innovation has led to the adoption of risk registers and/or informed changes to existing risk registers and crisis management systems. The research studio will develop a profile of different cities in view of the types of crises they have experienced and consider the extent to which they have led to CGI. Most of all, through interviews, the study will assess the role of risk registers in managing crisis, and the ways in which the experience of crisis may have led to the adoption or the updating of risk registers.

Approach A2: Based on available data regarding future threats, such as heat or flood maps, and other risk assessments, the studio will explore the extent to which the anticipation of future emergencies influences CGI. The presence of an acute threat might drive innovation or become a major source of resistance (following the ‘threat rigidity’ hypothesis). This research approach involves collecting data on future threats and exploring the extent to which those threats have been incorporated into existing risk registers. More generally, it allows the analysis to distinguish between ‘acute’ and ‘chronic’ risks and the ways in which city governments seek to systematically assess their cascading dynamics.

Approach B1: To identify the adoption of CGI in emergency management, the studio will conduct desk research on different cities’ published documentation about their approach to the adoption of a risk register and its overall organisation. For the desk-based research, the studio will develop a survey instrument to classify publicly available risk registers. City hall staff will also be directly surveyed on the capacities associated with the development of risk registers, followed up with semi-structured interviews to explore the organisation of risk registers in practice as well as the extent to which these instruments inform and are informed by the experience of acute crises (see also Approach C).

Approach B2: To expand our insights, and also consider the extent to which risk registers enable engagement with other relevant stakeholders, we will use, through survey questions and interviews, ‘snowballing’ to establish connections with risk and emergency governance networks and delegates in Europe, identify pioneering cities and, through these cities, find other cities they are working with, learning from or considered otherwise CGI leaders.

Approach C: We will explore, largely through survey and subsequent interview-responses, the extent to which CGI has informed actual emergency management, and how different services have responded to innovative forms of emergency management. We will therefore rely on our key informants in our select cities to snowball and expand our range of participants (where feasible).

3.2 Identifying Risk Registers

When identifying documents that can be classified as ‘risk registers’, we expect that they should include at least two basic components:

- The identification and comprehensive assessment of multiple risks from across the entire risk landscape facing a population, and
- An identification of mitigating actions that address these risks.

We expect risk registers to be formalised in a strategic, high-level document (which might range from glossy documents to detailed spreadsheets), though these take various forms and titles – risk register, risk assessment, risk and vulnerability analysis, resilience strategy, and so on. Such documents could also form part of a wider crisis or emergency planning and strategy document. Whatever the label, we expect such documents to provide a synopsis of the main risks facing a population, some assessment of those risks, and an outline of corresponding mitigations.

We expect possible variation in the types of risks and methods of risk assessment that can be observed on the one hand, and in the types of mitigation strategies and their level of specification on the other. To help capture how these approaches are designed and implemented in practice, we will collect data for each city studied based on the questions and through the methods set out in Table 10.

Table 10: Identifying and classifying risk registers

Source: Authors

Item question/topic	Collected through		
	Desk research	Survey	Interview
Is there a relevant document?			
• Yes/No	✓	✓	
• How is it described? (e.g. risk register, resilience plan, etc.)			
• Is it publicly available?			
How regularly is the document updated?	✓	✓	
What risks are included in the document?			
• Are these risks chronic, acute, or both?	✓		
• How comprehensive is the coverage of risks? Does it consider all threats or only certain types?			
What is the geographic scope of the document?	✓		
• Does it focus just on the city or on a larger geographic area?			
What organisation(s) hold(s) main responsibility for this document, and what level of government do they belong to?	✓		
• Is this the responsibility of the city government, some other tier of government, or both?			
Is there a legal/mandated requirement to produce this document?	✓		
• Yes/No			
Is this document formally connected to related exercises at the national and/or sub-national level?			
• Yes/No			
How are risks assessed?			
• What methods are used? Do documents assess risks in terms of impact x probability, or by some other method?	✓	✓	✓
• How does this break down by acute and/or chronic risks?			

Item question/topic	Collected through		
	Desk research	Survey	Interview
What is the nature of mitigations?			
- How prescriptive (i.e. how detailed) are the mitigations provided? - To what extent are mitigations presented as formal risk management controls, as interventions oriented towards prevention and resilience building, or as guidance aimed at informing and preparing the public?	✓		
What are the professional venues for decision-making/updating the document?			✓
Is there a non-public version?		✓	✓
How much information is in this version versus the public version?			
What is the perceived level of political and/or public awareness of this document?		✓	✓
What resources are made available to this exercise?			✓

Beyond the more structured approach set out above, important questions remain about how these documents are actually used in practice, the political, institutional and attentional biases that shape what gets included and how risks are framed, and the relational dynamics between city, sub-national and national tiers of government in producing and using them. Such matters are less readily captured by a structured data collection exercise, which is oriented primarily towards mapping variations in the documents. This is why we plan to explore those questions through follow-up interviews with city officials, alongside more open-ended questions about how city governments themselves perceive the adequacy of these instruments, and whether alternative or complementary approaches such as foresight methods, scenario planning, or other anticipatory tools are being adopted or considered.

In the living lab cities (section 4.5), these questions are pursued more intensively still: the embedded researcher works alongside city staff to map, in granular detail, who uses the existing register, who is absent from its production, and where in practice it interacts with operational emergency planning. The lab thereby produces a structured diagnostic of the existing register as the baseline against which co-designed upgrades to an integrated risk and emergency governance instrument are subsequently developed and assessed.

3.3 Data Collection

The research will focus on a range of activities. First, in line with the overall work of the CGI Observatory, it will focus on key indicators that point to the adoption of specific emergency governance practices over the past 15 years. In particular, it will examine:

- Decision-making and responsibility allocation of risk registers, including analysis
- Who leads in collaborative exercises
- Allocation of resources
- Capacities linked to emergency governance provision and innovation

Second, the study explores the risk landscape facing individual cities through desk-based research – drawing on the analysis of recent events facing cities and in investigating existing sources of information regarding the risk profile of cities, such as in terms of flooding or fire.

Third, by exploring, through desk research, surveys and semi-structured interviews, the process of creating and maintaining risk registers (along the questions identified in Section 3 above), and

engaging with insights gathered from actual emergencies, the research examines how cities have sought to manage – and innovate – the:

- Venues of formulating and updating city-level risk registers
- Allocation of resources to detecting emerging risks themselves, and the monitoring of administrative responses to ensure emergency governance readiness
- Deployment of resource to mitigate risks; and engagement with higher levels of government

Fourth, in five partner cities the research generates a distinct stream of longitudinal, co-produced data through living labs. Embedded researchers, working about one to two hours per week over 18 to 24 months in each city, will produce structured baseline assessments of the existing register, fieldnotes and process documentation of co-design workshops, records of prototype implementation and adaptation, and observation data from tabletop exercises or, where applicable, the management of acute incidents during the lab window. This lab-generated material is complementary to, and triangulated with, the desk-based, survey and interview data described above, and will be held to the same anonymisation and ethics standards.

Moving between the initial reliance on desk-based research, including surveys, to more in-depth semi-structured interviews will also enable us to identify sources of innovation that focus on underlying transformation rather than what might be dismissed as the production of mere ‘fantasy documents’ that emerge in the context of compliance-related activities or require a high degree of optimism bias for political reasons (such as mega-events, see Jennings and Lodge 2011). The living labs offer a particularly direct check against this risk: By accompanying an attempted upgrade through design, implementation and exercise, the research can distinguish documents that change institutional behaviour from documents that merely accumulate detail.

The four-year timeline of this study enables us to track developments in CGI and its utilisation for emergency governance across the 2026–2029 time-period. Such tracking will be performed in three ways. One is to return to select cities and explore the extent to which risk registers have been a source of innovation or have witnessed reform over the time period of our study. We will research these changes through surveys and through semi-structured interviews. Second, we will use the aftermath of acute crisis occurring in our sample of cities to explore through interviews the extent to which risk registers played a role in the actual management of emergencies, and the extent to which these experiences have led to an updating of the risk register itself as well as to the overall resourcing of emergency services. We will rely on interviews with key contacts in city halls as a primary resource to support the research. Third, the five living labs provide a continuous, longitudinal observation of CGI as it is being attempted, allowing change to be tracked not only as a before-and-after comparison but as an unfolding process across design, implementation, stress-testing and codification phases over a three- to four-year horizon.

3.4 Data Analysis

The research requires analysis of several different kinds of data:¹

- **The risk landscape facing cities:** We will collect information on each city's recent experiences with acute crises, as well as assessments provided by other organisations, to develop a 'risk landscape' facing each city. By coding responses according to risk type, our data will reveal commonalities and variations in the types of threats faced by cities. The data will be support interviews with relevant city managers as to how this risk profile compares with their own understanding of the risk landscape that their city faces. This interview-based verification process will help ensure that the profiles are reliable and support further analysis of risk registers in terms of risk prioritisation and updating.
- **Variations in risk registers:** Based on our desk research on risk registers, we will generate a systematic grouping of different approaches, based on the degree to which they analyse risks based on probability and impact, and the extent to which mitigation measures are clearly stated in risk registers. We will use publicly available information in the first instance. To ensure consistency, a codebook will be used, and each city's risk register will be assessed by two researchers. As noted above, the surveys of cities will be used to determine whether other, non-public frameworks exist and how they can be assessed and classified.
- **Semi-structured interviews:** The semi-structured interviews described above will be conducted on the basis of non-attributability (Chatham House rule). Depending on participants' willingness, we will use AI-assisted software to transcribe the interviews to allow for sharing among researchers. The interviews will be used, in part, to verify and update publicly available information. However, the main purpose of the interviews will be to explore the core research themes identified in Section 3. Coding responses will enable the research to identify the core challenges in using risk registers as a meta-management CGI – and it will also enable us to identify innovations that have emerged from the design and operation of risk registers. The information gained from these interviews will be coded to understand better the drivers for innovation that lead to the adoption and updating of risk registers, especially in terms of questions of decision-making venues, risk detection and resource mobilisation. We will use initial interviews to develop a shared understanding of initial codes and then develop a shared codebook that will be refined over the course of the research. To protect the anonymity of participants, all files will be anonymised.
- **Living lab data:** The five labs produce three distinct analytical operations beyond the comparative interview work above: (i) structured before-and-after comparison applies the risk-register codebook at the start and end of each lab, ensuring that change is documented in commensurable terms across sites; (ii) process tracing of specific decision episodes within each lab (for example, the moment a particular risk is added, reframed, or rejected) identifies the micro-mechanisms of CGI that comparative work cannot see; (iii) cross-lab comparison is organised around the question of why a similar upgrade ambition travels differently across contexts, which sits at the heart of an extrapolation-based approach and is well calibrated to a five-site design. Lab fieldnotes, workshop documentation and exercise observation are coded using the shared codebook, supplemented by lab-specific codes that emerge inductively and are reconciled across embedded researchers at monthly cross-lab convenings.

In view of the interest in both risk registers as a city government innovation and the innovation of processes to organise for risk registers as a system of emergency management, the living lab analysis will focus on extrapolation (Bardach 2004, Barzelay 2007). The interest of the analysis is to explore

¹ The research methods and data management systems have undergone the LSE ethics and data management clearance process under reference number 693795 ('City Government Innovation Observatory').

variation of innovative approaches, rather than explaining ‘why’ a particular city may have adopted one particular approach rather than another.

An extrapolation-based approach examines the underlying mechanisms that make an innovation successful in a jurisdiction, with careful attention to the prerequisites that enable successful innovation, such as the availability of resources or existing standard operating procedures and organisational cultures. Through semi-structured interviews, the analysis will seek to establish essential elements of innovative practices and contrast those which might be regarded as ‘nice to have’ or optional. At the same time, an extrapolation-based analytical approach to policy learning enables the analysis also to highlight potential vulnerabilities associated with innovative practices.

The living labs are particularly well suited to this analytical mode: By accompanying attempted innovations through design, adoption, stress-testing and adaptation in five contrasting settings, the labs make visible the prerequisites and enabling conditions that retrospective comparison can only infer. The labs thereby supply the strongest evidence base for distinguishing essential from optional elements of integrated risk and emergency governance practice. Indeed, extending the discussion to how CGI in risk management has affected the management of actual emergencies will benefit from such approach, as it highlights the importance of underlying resources and capabilities.

4 Preliminary Findings: ECLI Cohort 01 Survey

This section presents the results of a survey of the first cohort of ECLI cities, designed to explore the type of crises that European cities have witnessed in recent years, and what kind of responses they have taken. The survey data were supported by background research into the different cities.

To assess the risk landscape confronting European cities, we surveyed 30 cities taking part in the first cohort of the ECLI programme on up to three major crises, emergencies or uncertainties over the last 15 years and how these cities innovated in response to them. Specifically, cities were asked:

How has your city government innovated (in line with city government innovation as defined previously) in response to a major crisis, emergency or uncertainty over the past 15 years (this could be related to COVID-19 or a different crisis or event)? Could you please specify the type of innovation and how exactly it was prompted by a crisis? Please list up to three crises and the resulting city government innovation by degree of importance.

Table 11 summarises the coded responses, the major crises that sparked innovations, CGI action types (one per innovation), and the corresponding CGI policy domains (multiple per innovation). Of the 30 cities surveyed, 27 responded with at least one crisis; 56 crises and 76 innovations were reported in total. Several crises were mentioned by more than one city, including Covid (22), floods (6), the climate crisis (5), fiscal crises such as city government debt or budget shortfalls (4), an influx of refugees resulting from the war in Ukraine (3), a housing affordability crisis (2), and crises arising from shifts in the local economy (2). Several other crises were each reported by one city: earthquake, riots, social division, a cybersecurity attack, energy cost crisis, heatwave, terrorist attack, damage to building and infrastructure from war, crime, mounting uncollected waste, a fireworks disaster, and political backlash to a proposal to build a US military base locally.

Table 11: City responses to CGI Major crises survey question

Source: Authors

Overview of responses to CGI major crises questions		Innovations sparked by crises: CGI action types	
Number of cities that reported at least one crisis and innovation	27	(1) Urban democratic and civic innovation	11
Number of crises reported	56	(2) City administrative and organisational innovation	14
Number of reported innovations that were sparked by crises reported	76	(3) Urban finance and procurement innovation	9
Major crises reported that sparked innovation		(4) City-level digital and data-driven innovation	20
		(5) Urban policy and regulatory innovation	12
		(6) City service innovation	10
		Innovations sparked by crises: CGI policy domains	
		General Administration	25
		Health	15
Covid	22	Economic Development	9
Flooding	6	Environment	8
Climate crisis	5	Emergency Services	8
Fiscal crisis	4	Water	6
War in Ukraine (refugee influx)	3	Education	6
Housing crisis	2	Transport	5
Local economy shifts	2	Energy	4
Earthquake	1	Housing	4
Riots	1	Social Services	4
Social division	1	Civic Life	4
Cybersecurity attack	1	Planning	3
Energy crisis	1	Democratic Engagement	2
Heatwave	1	Culture	2
Terrorist attack	1	Waste	1
War in Ukraine (damage to buildings and infrastructure)	1		
Unpopular development	1		
Crime	1		
Fireworks disaster	1		
Unmanaged waste overflow	1		

These main crises can be grouped into the following five main interrelated themes:

- **Pandemic:** Cities reported grappling with the challenges of managing Covid-related issues, including the need to provide public services digitally and dealing with public health capacity limitations. More generally, Covid-19 also represented a significant economic factor, leading to a sharp reduction in revenue from economic activities, including tourism.
- **Climate and natural disasters:** Here the survey revealed the extensive experience of human-enhanced extreme weather events, including extreme flooding and heatwaves. Other disasters due to natural hazards, such as earthquakes, were also reported. Other cities reflected on the global climate crisis as a ‘creeping’ crisis worthy of anticipatory action in both mitigation and resilience-building.
- **Fiscal and local economic crises:** Many cities reported a lack of funding as a crisis, whether relating to a reduction in funding from central government, long-term city debts, or global

economic shocks such as the 2008 financial crisis or the inflationary effects of Covid and the invasion of Ukraine in 2022. Cities also reported crises related to the nature of the local economy, including transitioning away from coal mining or shortage of space for R&D.

- **Security:** Some cities experienced terrorist attacks or riots, or were exposed to active warfare, with frequent damage to buildings and infrastructure. Among the more contemporary modern hybrid warfare crises, one city noted extensive cyber-attacks targeted at the city government itself.
- **Social emergencies:** Multiple reported crises were social emergencies, including issues relating to housing affordability, growing social divisions, and the wide-ranging challenges arising from a large influx of refugees, including the logistics of administering housing and other supportive public services, or issues relating to rapid changes in the local economy. One-off issues that caused political backlash were also cited, including prolonged uncollected bin waste and a proposal to build a US military airbase locally.

From these 56 crises, 76 innovations were reported in the survey, with many crises sparking multiple innovations. Categorised by the type of CGI action, city-led digital and data-driven innovations were the most frequent (20), in large part owing to the high focus on increasing digital technology capacity in response to Covid-19, allowing society to function while people remained physically separated. Following this in frequency were city administrative and organisational innovations (14), urban policy and regulatory innovations (12), urban democratic and civic innovations (11), city service innovations (10), and urban finance and procurement innovations (9).

Innovations sparked by crises and major emergencies were situated in either multiple policy domains (24) or one policy domain (52). The most frequent policy domains involved in the reported CGIs were general administration (24), health (15), economic development (9), environment (8), emergency services (8), water (6), education (6) and transport (5). Energy, housing, social services, civic life, planning, democratic engagement, culture and waste each featured less than five times.

Most respondents reported Covid as a top-three major crisis. This is in many ways unsurprising, given how disruptive the pandemic was as a global protracted crisis. The response may also be a result of the survey question specifically mentioning Covid-19 and thus leading the responder to include this in their answer. Accordingly, it is also unsurprising that we see health as the top policy domain where innovations were focused (outside of general administration) and city-led digital and data as the most frequent CGI action category.

Beyond Covid and digital-led innovations, other patterns emerge between the type of crisis and type of innovation sparked. For example, fiscal crises in cities (e.g. significant debt or inflationary shocks) often led to simultaneous innovations in both internal administrative or financial processes and reforming public services. Where the crisis was framed as the ‘climate crisis’, the resulting innovations were mainly policy and regulatory, whereas already-experienced disasters (floods, heatwaves, earthquakes) sparked the full spectrum of CGI action types.

Common to innovations following security crises was greater internal coordination within the state apparatus, whether through innovations in governance, audit or communication. Elements of innovation within cities experiencing war appear to mirror pandemic innovations, including accessing services remotely through digital innovations and a greater role for communities and citizens in running some public service functions. Social emergencies most frequently sparked innovations in policy and regulation, often relating to the built environment, while those that sparked political backlash included innovations in democratic and civic processes.

It is noticeable – but again, probably related to the (intended) nature of the survey asking about crises and innovations rather than how risks are managed – that cities did not report the adoption of innovative risk management systems that cut across the different crisis domains. Instead, the survey data suggest reactive responses in view of experienced crises.

These initial findings reveal several patterns that encourage further research. For example, do the reported crises shape the ways in which different cities imagine the future (including on risk

registers), not just in terms of topics, but also in terms of their ranking? Do ‘pandemics’, for example, feature as a ‘high probability, high impact’ risk on all risk registers given the recent experience of the protracted Covid-19 crisis? Similarly, to what extent do the reported innovations represent genuinely novel interventions (novel for the location and area), and to what extent have they gone hand-in-hand with a sustained capacity-enhancing resourcing?

Relatedly, do the findings of the desk research, especially the clustering of different cities, reflect on the actual perception of city managers in these different cities and regions? Are some crises that were reported in our sample seen as more or less important by city managers? Furthermore, do the reported findings reflect on the prominence and comprehensiveness of risk register at the city level?

5 Conclusion

In sum, this study approaches city government innovation in terms of: (i) the ways in which ‘risk registers’ and related synoptic tools are introduced into city government, (ii) the ways in which city governments innovate to mitigate against the biases introduced through risk registers, and (iii) the ways in which risk registers have provided for innovative practices in the planning for, and managing of, crises and complex emergencies.

Technologies of governing that encourage the imagination of the future are increasingly essential in a changing risk and crisis landscape (Ellis Erle 2024). Risk and risk management have been a central organising theme in private and public governance over the past two decades or so (LaPorte 2007). The emergence of this programmatic idea of governing has spread from the world of corporate governance to public organisations. As a technology of governing, it relies centrally on ideas of internal control, supervised by external oversight.

The research thus focuses on a question central to the contemporary literature: how programmatic ideas and technologies, such as ‘risk’, travel into the world of city government innovation and emergency management. For one, the use of ‘risk registers’ promises city governments a ‘whole system’ approach towards emergency management. At the same time, if understood as a system of control, risk registers, as technologies of imagination, require understanding ‘what to look for’ (e.g., detection), decision-making venues, and rules to include and exclude certain risks. Finally, they require resources to modify emergency management systems in view of diagnosed shortcomings.

This research investigates the underlying reasons for the introduction of risk registers and their variation across cities; thereby focusing, first, on risk registers as an innovation. Second, in view of the literature’s account of potential vulnerabilities and trade-offs in relying on risk registers for city emergency management, the study also focuses on the extent to which cities have innovated to address such knowledge vulnerabilities. Third, and finally, the research focuses on select acute crises and emergencies to explore whether risk registers ‘mattered’.

This study is thus timely and relevant to both practice and research. The world of research will acquire a much-needed focus on city government innovation in view of the changing risk landscape. The different research approaches provide for considerable scope to explore conditions of innovation and the consequences of innovation. For the world of practice, the research develops understanding and smart practices for the development of risk registers and for identifying innovative practices to overcome Achilles’ heels and blind spots relating to particular governance arrangements.

Appendix A1 – Scoping Literature Review

A.1 Introduction

As part of this workstream, we conducted an initial scoping review of the scholarly literature on city government innovation for complex emergencies. Scoping reviews map the scope and coverage of a body of literature on a given topic, providing a clear indication of the volume of studies available and an overview of their focus, and are particularly useful for examining emerging evidence when it is still unclear what more specific questions could be posed and more precisely addressed by a systematic review (Munn et al. 2018). Given the dispersed nature of research that addresses (i) government/public sector innovation (ii) at the city government level, and (iii) in relation to crisis, emergency, disaster, resilience or risk management, a scoping review may also serve as a useful method for pulling together the literature on this workstream's topic.

This appendix sets out an initial strategy for conducting a scoping review for the CGI Emergencies workstream. If we develop this strategy, we will be following PRISMA guidance on conducting scoping reviews (Tricco et al. 2018). This current version of the strategy is focussed on establishing eligibility criteria, search and selection procedures, information sources, search queries, and data items to be captured. It also provides some early-stage insights into the relevant literature, based on preliminary analysis of a sample of 42 relevant articles already identified through Web of Science. Having conducted some preliminary analysis, the final section also considers potential limits to this approach and how we might approach any future continuation of this work.

A.2 Eligibility and Inclusion Criteria

To be included in the review, evidence must be from articles written in English and published in peer-reviewed academic journals from 1990 onwards. The following list specifies initial further criteria for inclusion in terms of articles' substantive focus and approach (please note this is an initial set of criteria and subject to further refinement).

- Articles for inclusion must focus on city government innovation, defined as the creation, development, and/or implementation of novel ideas, processes, services, technologies, or governance models by city governments. Articles that focus on public sector innovation in an urban context may also be included.
- This may relate to concrete innovations (for example, new digital platforms or organisational processes) or broader aspects of innovation, such as the capacity or ability to innovate, or the relationship between innovation and urban governance.
- Articles for inclusion must discuss city government innovation as it relates to managing complex emergencies, which can be interpreted to include topics such as crisis and emergency management/governance, disaster risk reduction, resilience, and risk management/governance.
- Articles discussing urban social innovation (including Urban Labs, Living-Labs etc.) may be included, providing the article focuses on social innovation for managing complex emergencies in ways that reasonably relate to the role of city government or the wider public sector in this. However, articles that discuss autonomous forms of urban social innovation – i.e. innovation not involving the participation of state actors, such as innovation solely among self-organising communities or civil society groups – are not included.
- Articles adopting theoretical, conceptual and empirical work may all be included.
- Articles that introduce new methodological or analytical tools described as 'innovations' that city government could (hypothetically) adopt but focus chiefly on technical demonstrations of how these tools address forms of crisis, disaster, risk and emergency, are not included.
- Articles whose main focus is not on city government innovation for managing complex emergencies but may include passing references, recommendations or conclusions

emphasising the importance of government innovation in an urban context relating to this topic are not included, as they generally do not engage substantively enough with the topic.

A.3. Search and Selection Process

Figure A.3.1. outlines a process for identifying eligible articles for a CGI Emergencies scoping review. Articles are first identified through systematic search queries in Web of Science and targeted journal searches, as well as from articles included in existing systematic reviews of the public sector innovation literature (see Sections A.4 and A.5). Bibliographic data files (BibTeX) from these searches are then exported to Rayyan, a web-based platform for managing collaborative systematic and scoping reviews. In Rayyan, team members first screen article titles and abstracts for suitability, followed by full-text review to confirm eligibility for inclusion.

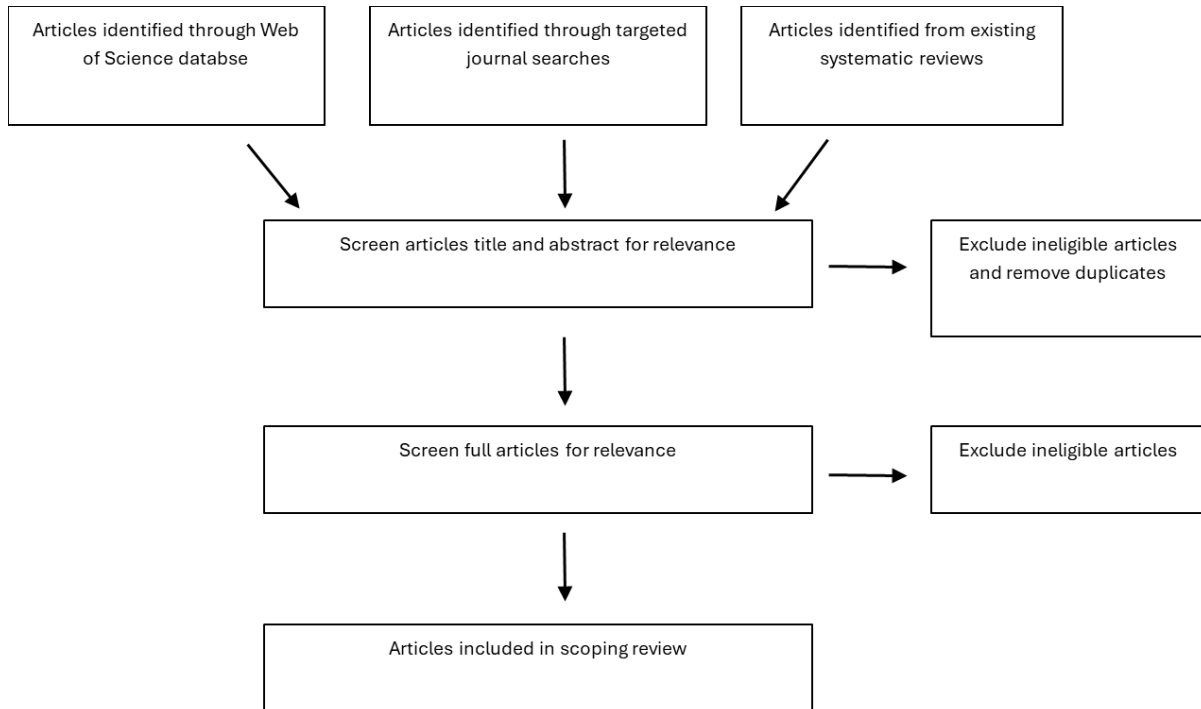


Figure A.3.1. Scoping Review Search Process

A.4. Information sources

The top row of Figure A.3.1. shows three general information sources we will use to identify articles. As part of the provisional analysis, we have so far conducted some initial searches based on the Web of Science and targeted journal searches described below.

- **Web of Science:** We will search the Web of Science bibliographic database, focusing our searches in several ways. First, we search all articles indexed under any of the Web of Science categories Public Administration, Political Science, Regional Urban Planning, Urban Studies, Sociology, Geography, Economics, or Environmental Studies. We have conducted a version of this search in the provisional analysis; search term queries for this search are described in Section A.5. Second, we will do a wider search of all articles indexed in the Social Sciences Citation Index. Potential search term queries for this second search are discussed in Section A.5.
- **Targeted journal searches:** We will conduct targeted searches for articles in specific subfield journals, for instance in public administration, public policy and urban studies, which are known to contain likely relevant material. An exact list of journals has yet to be finalised but will be based on factors such as subject-expert assessments of relevance, quality and suitability. We will search within these journals via Web of Science, but with adapted search

terms. We have conducted a version of this search in the provisional analysis and search terms for these targeted journal searches are provided in Section A.5. The journals included in this initial search are: *Journal of Public Administration Research and Theory*, *Public Administration Review*, *Public Administration*, *Public Management Review*, *Regulation & Governance*, *Administrative Science Quarterly*, *Governance*, *Policy Studies Journal*, *Journal of European Public Policy*, *Government Information Quarterly*, *Policy and Society*, *Journal of Public Policy*, *Policy & Politics*, *Policy Sciences*, *International Review of Administrative Sciences*, *Local Government Studies*, *American Review of Public Administration*, *Administration & Society*, *Review of Public Personnel Administration*, *Public Money & Management*, *Public Performance & Management Review*, *Cities*, *Urban Studies*, *Journal of Urban Affairs*, and *Journal of Urban Management*. This list is subject to further review.

- **Existing systematic reviews:** We will search for articles already featured in published systematic reviews on public sector innovation and innovation in crisis management. These reviews contain potentially relevant cases of city government innovation for complex emergencies in their analysed data, but this has not been examined to verify whether the articles specifically study city governments. Specifically, we will look to include in our search articles reviewed in Criado et al.'s (2025) systematic review of public sector innovation, as this is the most recently published review in this area, and Venemyr's (2024) systematic review of crisis management innovation.

A.5. Search Queries

We construct search queries based on combinations of keywords relating to four conceptual categories: cities + innovation + government + crisis management. Following a similar approach to Criado et al.'s (2025) systematic review of public sector innovation, our terms for the innovation category include 'innovat*' as well as 'lab' and 'laborator*', in order to capture public innovation laboratories, which are a known setting for innovation in public organisations, including in city governments (Dekker et al. 2021). Because we are interested only in city government organisations, or at least public sector organisations operating in an urban context, we also focus on keywords grouped under the cities and government categories. For the crisis management category, we view this as a compound concept made up of two elements ('crisis' and 'management'). Accordingly, we specify two lists of relevant keywords (e.g. 'disaster' and 'planning') that, when combined, generate compound terms (e.g. 'disaster planning') that describe activities similar to crisis management.

The conceptual categories, specific keywords, and search structure can be adapted based on the information source queried through Web of Science. For instance, when searching urban studies journals, requiring city-specific keywords may be unnecessary and potentially counterproductive, since an urban focus is implicit in such publications. Including these terms risks excluding relevant materials where the urban context is already established. As mentioned in Section A.5, two separate information sources have been searched so far, and we report search terms for these below. All searches search for keywords in article title, abstract and keywords (TS), or just in paper titles (TI) and keywords (AK).

For the search across specific Web of Science categories, we run the following BOOLEAN search query:

- TS=(local* OR city* OR cities* OR urban* OR municipal* OR metropol*) AND TS=((crisis* OR crises* OR emergenc* OR disaster* OR risk* OR contingenc* OR hazard*) NEAR/3 (manag* OR respon* OR response* OR prepar* OR plan* OR reduction*)) OR resilen*) AND (TI=(innovat* OR lab OR laborator*) OR AK=(innovat* OR lab OR laborator*))
- Note that this search query includes no terms pertaining to government, because in many of the literatures captured in the specific Web of Science categories being explored here,

discussions of innovation in relation to complex emergencies in cities are generally about government's (rather than the private sector's) role anyway. If we were to do a search on all categories for papers in the Web of Science Social Science Citation Index, we may need to further restrict by including government keywords (for example TS=(public* OR state* OR govern* OR administrat* OR policy*).

For the targeted journal search via Web of Science, we run the following BOOLEAN search query:

- TS=((crisis* OR crises* OR emergenc* OR disaster* OR risk* OR contingenc* OR hazard*) NEAR/3 (manag* OR respon* OR response* OR prepar* OR plan* OR reduction*)) OR resilen*) AND TS=(innovat* OR lab OR laborator*)
- Note this search query includes no terms pertaining to government or city. Again, the journals in this targeted search are much more likely to relate to government. We also relax requirements for city keywords, because while not all these targeted journals are specifically focussed on cities and the urban environment, many articles in those journals study cases from urban contexts without explicitly identifying or conceptualising them as such in their title, abstract or keywords.

Running these search queries for each of the respective information sources included in the provisional analysis returned 222 unique articles. Following a review of each paper abstract, it was decided that 42 papers were potentially relevant and to be examined further.

A.6. Data Items

Once team members have read an article in full and determined it to be relevant and suitable for inclusion, they extract and chart information relating to the data items (or 'variables') of interest for each article. For the provisional analysis, we have only reported on a select number of items for the 42 articles initially identified as relevant, but would look to record further data items which capture other dimensions of importance to this workstream in later iterations. Some of these items can be identified directly from the article's metadata, while others will require closer examination of the article itself. The current data items captured in the provisional analysis are listed below.

- Geographical focus (continent and country)
- Methodological approach
- Types of crises/emergencies studied
- Number of cities studied

A.7. Provisional Analysis

Tables A.7.1 to A.7.6 report the article counts for those data items currently labelled as part of the provisional analysis of 240 articles. As a reminder, for the provisional analysis, this labelling is only based on an assessment of article titles and abstracts.

*Table A.7.1 – Breakdown of geographical focus of papers by continent**

CONTINENT	COUNT
EUROPE	15
ASIA	14
AFRICA	3
NORTH AMERICA	7
SOUTH AMERICA	1
OCEANIA	1
NONE/UNKNOWN	1

** With the exception of 'NONE/UNKNOWN', continent categories are not mutually exclusive.*

Table A.7.2 – Breakdown of geographical focus of papers by country•

COUNTRY	COUNT
USA	7
CHINA	6
ITALY	5
INDONESIA	3
UK	3
BELGIUM	2
GERMANY	2
INDIA	2
NETHERLANDS	2
SINGAPORE	2
ARGENTINA	1
AUSTRALIA	1
BRAZIL	1
CANADA	1
COSTA RICA	1
FRANCE	1
ISRAEL	1
IVORY COAST	1
JORDAN	1
KENYA	1
MEXICO	1
MOROCCO	1
PARAGUAY	1
PERU	1
PHILIPPINES	1
RWANDA	1
SENEGAL	1
SIERRA LEONE	1
SOUTH AFRICA	1
SWEDEN	1
NONE/UNKNOWN	3
VIETNAM	1

** With the exception of 'NONE/UNKNOWN', country categories are not mutually exclusive.*

Table A.7.3 – Breakdown of papers by methodological approach*

METHOD	COUNT
QUALITATIVE: SINGLE CASE STUDY	18
QUALITATIVE: MULTIPLE/COMPARATIVE CASE STUDY	11
QUANTITATIVE: OBSERVATIONAL	13
QUANTITATIVE: QUASI-EXPERIMENTAL	0
QUANTITATIVE: EXPERIMENTAL	0
NO METHOD	4
OTHER METHOD	2

* With the exception of 'NO METHOD', method categories are not mutually exclusive.

Table A.7.4 – Breakdown of papers by crisis/emergency type studied (high level only) * **

EMERGENCY TYPE	COUNT
COVID-19	13
ROUTINE	8
NON-ROUTINE	17
COMPLEX	25

* Aside from the COVID-19 category, categories are based on LSE CITIES 2024 'GOVERNING COMPLEX EMERGENCIES AT THE LOCAL LEVEL'.

** Emergency types are not mutually exclusive.

Table A.7.5 – Breakdown of papers by crisis/emergency type studied (all categories) * **

EMERGENCY TYPE	COUNT
COVID-19	13
ROUTINE_GENERAL	3
ROUTINE_DAILY_MEDICAL	0
ROUTINE_DAILY_FIRE	0
ROUTINE_DAILY_SEARCH_RESCUE	0
ROUTINE_DAILY_FOOD_SAFETY	0
ROUTINE_DAILY_OTHER	0
ROUTINE_REGULAR_TECH	0
ROUTINE_REGULAR_INFRA	2
ROUTINE_REGULAR_THUNDERSTORM	3
ROUTINE_REGULAR_WIND	0
ROUTINE_REGULAR_WINTER	1
ROUTINE_REGULAR_AVALANCHE	0
ROUTINE_REGULAR_OTHER	0
NON_ROUTINE_GENERAL	0
NONROUTINE_HUMAN_NUCLEAR	0
NONROUTINE_HUMAN_TERRORISM	1
NONROUTINE_HUMAN_CHEMICAL	1
NONROUTINE_HUMAN_WAR	0
NONROUTINE_HEALTH_EPIDEMIC	0
NONROUTINE_HEALTH_FAMINE	0
NONROUTINE_HEALTH_AIRPOLLUTION	0

NONROUTINE_HEALTH_OTHER	0
NONROUTINE_NATURAL_VOLCANO	0
NONROUTINE_NATURAL_EARTHQUAKE	5
NONROUTINE_NATURAL_TSUNAMI	3
NONROUTINE_NATURAL_METEORITE	1
NONROUTINE_NATURAL_OTHER	1
NONROUTINE_HUMANNATURAL_HEATWAVE	2
NONROUTINE_HUMANNATURAL_COLDWAVE	2
NONROUTINE_HUMANNATURAL_WILDFIRE	2
NONROUTINE_HUMANNATURAL_DROUGHT	3
NONROUTINE_HUMANNATURAL_HURRICANE	3
NONROUTINE_HUMANNATURAL_TORNADO	1
NONROUTINE_HUMANNATURAL_FLOOD	13
NONROUTINE_HUMANNATURAL_MOUNTAIN	0
NONROUTINE_HUMANNATURAL_OTHER	1
COMPLEX_GENERAL	3
COMPLEX_GLOBAL_CLIMATE	8
COMPLEX_GLOBAL_HEALTH	11
COMPLEX_GLOBAL_OTHER	0
COMPLEX_SOCIAL_HOUSING	3
COMPLEX_SOCIAL_MIGRANT	2
COMPLEX_SOCIAL_RACIAL	0
COMPLEX_SOCIAL_UNREST	0
COMPLEX_SOCIAL_ECONOMIC	0
COMPLEX_SOCIAL_OBESITY	0
COMPLEX_SOCIAL_OTHER	0

* Aside from the COVID-19 category, categories are based on LSE CITIES 2024 'GOVERNING COMPLEX EMERGENCIES AT THE LOCAL LEVEL'.

** Emergency types are not mutually exclusive.

Table A.7.6 – Breakdown of papers by number of cities studied

NUMBER OF CITIES	COUNT
1	19
2–5	5
6–20	1
21–50	3
51–100	1
101+	1
NONE/UNKNOWN	12

A.8. Limitations and Future Options

Although systematic and scoping reviews can help build a wider understanding of the literature on city government innovation in response to complex emergencies, this approach has potential limitations in this situation that are worth reflecting on. First, city government innovation for complex emergencies is already a highly specific topic, and there are limits to how credibly we can identify an

appropriate sample of papers that represents the hypothetical universe of relevant research on this topic. The topic may not be easily ‘found’ through general search term queries. However, by searching across multiple information sources as described above, we can increase the likelihood of uncovering a diverse and relevant knowledge base that would not otherwise be known. Still, caution should be exercised in assuming this corpus comprehensively reflects the body of literature on city government innovation for complex emergencies.

Second, while the 42 papers included in the initial review appear to contain some relevant contributions (based on an initial skim), much closer attention to these works is necessary to determine whether they are appropriately matched materials for this workstream, which seeks to study an already nuanced and specific topic. It is entirely possible that upon further review, many papers will no longer be found relevant, meaning the exercise uncovers only a small number of papers from which there is little to learn. Of course, one might argue that finding only a small number of papers could itself be a telling insight, but this is only credible if we are certain the types of problems described in the above paragraph do not apply.

Third, as is the case with systematic literature reviews in the contemporary age, there is a potential issue of research quality amongst the papers uncovered through this exercise. Whilst relevant papers do include submissions from reputable journals with quality empirical and/or theoretical work, in other cases some submissions lack clear or robust empirical strategies and/or are published in venues where the quality of peer review is unknown or the subject of some concern in terms of research quality or integrity (for instance, many papers uncovered were in MDPI-owned publications, which have come under question by some research communities). Most of these types of papers were those found via the Web of Science searches that did not limit to predefined journals. Future exploration might set further standards for inclusion in any review, or reconsider the overall aims of a systematic literature survey, namely viewing it as less orientated towards systematically reviewing or scoping the evidence and knowledge base on this topic, but rather more pragmatically focussed on scanning for novel ideas.

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Appendix A2 – Key Terms and Definitions

Term	Definition	Authoritative Source
Hazard	A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.	UNDRR, Sendai Framework Terminology (2017)
Exposure	The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.	UNDRR, Sendai Framework Terminology (2017)
Vulnerability	The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.	UNDRR, Sendai Framework Terminology (2017)
Capacity	The combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience.	UNDRR, Sendai Framework Terminology (2017)
Disaster	A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to human, material, economic and environmental losses and impacts.	UNDRR, Sendai Framework Terminology (2017)
Disaster risk	The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.	UNDRR, Sendai Framework Terminology (2017)
Risk	The effect of uncertainty on objectives.	ISO 31000:2018 / ISO Guide 73:2009
Risk register	A record of information about identified risks.	ISO Guide 73:2009
Risk register (alt.)	A repository of risk information including the data understood about risks over time.	NIST SP 800-221 / OMB Circular A-11
Disaster risk assessment	A qualitative or quantitative approach to determine the nature and extent of disaster risk by analysing potential hazards and evaluating existing conditions of exposure and vulnerability that together could harm people, property, services, livelihoods and the environment on which they depend.	UNDRR, Sendai Framework Terminology (2017)
Disaster risk governance	The system of institutions, mechanisms, policy and legal frameworks and other arrangements to guide, coordinate and oversee disaster risk reduction and related areas of policy.	UNDRR, Sendai Framework Terminology (2017)
Disaster risk management	The application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses.	UNDRR, Sendai Framework Terminology (2017)
Disaster risk reduction	Aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.	UNDRR, Sendai Framework Terminology (2017)
Disaster management	The organization, planning and application of measures preparing for, responding to and recovering from disasters.	UNDRR, Sendai Framework Terminology (2017)
Prevention	Activities and measures to avoid existing and new disaster risks.	UNDRR, Sendai Framework Terminology (2017)
Mitigation	The lessening or minimizing of the adverse impacts of a hazardous event.	UNDRR, Sendai Framework Terminology (2017)

Preparedness	The knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters.	UNDRR, Sendai Framework Terminology (2017)
Early warning system	An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities, systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events.	UNDRR, Sendai Framework Terminology (2017)
Response	Actions taken directly before, during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.	UNDRR, Sendai Framework Terminology (2017)
Recovery	The restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and “build back better”, to avoid or reduce future disaster risk.	UNDRR, Sendai Framework Terminology (2017)
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management.	UNDRR, Sendai Framework Terminology (2017)
Critical infrastructure	The physical structures, facilities, networks and other assets which provide services that are essential to the social and economic functioning of a community or society.	UNDRR, Sendai Framework Terminology (2017)
Residual risk	The disaster risk that remains even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.	UNDRR, Sendai Framework Terminology (2017)
Risk transfer	The process of formally or informally shifting the financial consequences of particular risks from one party to another, whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.	UNDRR, Sendai Framework Terminology (2017)
Build back better	The use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment.	UNDRR, Sendai Framework Terminology (2017)

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