Data for Emergency Management

CONTEXT

In recent years, the significant increase in the frequency, intensity and impact of natural disasters and all kinds of crises explains why the governance of emergencies is at the core of public policy.[1] The governance of emergencies refers to coordinating and managing resources and responsibilities regarding the mitigation of, preparedness for, response to, and recovery from an emergency.[2] Emergencies have been defined as the product of risk and urgency, and recent assessments predict that their frequency and level of impact will likely increase over the coming years.[3]

This reality results in a new category of emergencies: complex emergencies. These are situations that are global or deeply embedded in the current socio-economic system. One of the main characteristics is that these emergencies are not triggered by disasters that have already happened but rather require rapid and radical action to avoid future disasters or catastrophes.[4] In this intricate context, data is central to respond effectively to those emer-gencies. Gathering, managing, and analyzing big data is key to integrating a data-driven approach into each phase of the emergency management.[5]

Leveraging big data and technological advances improve the efficiency and effectiveness of emergency management. However, data use has significant challenges regarding inclusion, traceability, and privacy. The main question is how to integrate data to support emergency management while at the same time ensuring representativeness, generating trust, facilitat-ing multi-scalar and intergovernmental coordination.

Scale and reach of potential emergencies

There are two trends worth recognizing that have an impact on emergency management. First, the scale of challenges and their potential solutions. Second, the increasing importance of planning and preparedness to confront these new realities.

As the world continues to urbanize, a new scale of analysis, management, and coordination is gaining traction: the metropolitan scale.[7] As urban dynamics surpass administrative bound-aries, new coordination challenges arise because of the multiple government tiers in this ter-ritorial scale. Then, when promoting the use of data for more efficient emergency manage-ment, Local and Regional Governments (LRGs) needs to assess the scale of the challenge and its solution to map all stakeholders involved and design the necessary coordination schemes.

According to each LRG context and capacity, there should be a planning strategy to pre-vent and deal with emergencies. In this realm, a series of developments are worth mention-ing, like the urban resilience planning tools developed by the Resilient Cities Network. These guides and methodologies touch on cross-sectoral resiliency, water resiliency, infrastructure resiliency and social and racial equity concepts. There is also a joint effort from the Prepare Center and the Global Disaster Preparedness Center to create a resource library. A searchable inventory of documents (program documentation, policies, annual reports, lessons learned, guidance, and tools and methodologies) related to hazards and disaster preparedness in cities and communities worldwide.[8]

All these efforts are center around the importance of data as a basic input for decision mak-ing. The underlying argument is that LRG needs to broadly assess its potential risks, dangers, and emergencies and prepare accordingly leveraging on data.

1. **Assess potential emergencies and scales.** Understand the potential emergencies your city will face and their scale. This will provide insightful guidance for the data collection process and potential stakeholders and multi-scalar partnerships necessary to face the crisis. Local and regional governments and metropolitan authorities will face complex emergencies combining geographical, natural, economic, social, and political elements. Understanding all the potential risks, probability of occurrence, critical variables, and key coordination and governance schemes to set in motion are essential to get ahead of the curve and be ready to take action.

2. **Invest in resilient digital infrastructure and data gathering and management.** LRGs needs to deploy a tailored investment plan to increase resiliency on digital infrastructure and data. Expending resources to prepare for emergencies takes a high toll on approval but is the right path to ensure digital and data sovereignty, which guarantees the availability to gather, access, and analyze data in an emergency context to support actions at the local level. By doing so, the dependency of third parties will decrease, LRGs will have a broader band of action, and the response speed will rely on their capacity.

3. **Ensure an inclusive and representative data-gathering process.** To ensure a promptly and assertive decision-making process in the context of emergency management, the underlying data should represent the real needs, and conditions of the population exposed to the event. Therefore, it is necessary to enlarge the spectrum through which relevant data for emergency management is collected, guaranteeing the

Coverage, access and inclusiveness

As stated by UN-Habitat in the World Cities Report 2022, expanding the spatial reach of digital infrastructure is seen as the most fundamental requirement to counteract the digital divide(9). However, this effort need to be supported by a broader range of policies:

   i. Expanding the spatial reach of digital infrastructure (services, connectivity, content, etc.)

   ii. Increasing coverage (accessing affordable, stable, reliable, and fast broadband connections),

   iii. Guaranteeing access (providing the devices needed to use the infrastructure)

   iv. Promoting usability (user-friendly services and devices and promoting digital skills)(10,11).

Suppose there is no prioritization of issues like affordability, skills development, and the productive use of digital tools. In that case, digital inequalities will remain, which is disturbing from the emergency management perspective because it means higher vulnerability to emergencies and lower access to adequate responses.

For example, the Marron Institute of Urban Management published research on [Measuring Inequality in Resilience to Natural Disasters Using large-scale Mobility Data](#) by quantifying neighbourhood-level evacuation and recovery patterns in Houston during Hurricane Harvey.[12] Based on the analysis of large-scale geo-tagged information and its application to urban resilience and emergency management, the research found that " When comparing neighborhoods with similar flood risk, communities with higher proportions of racial and ethnic minorities and renter households experienced a 37% decline in local activity levels, a shock that persisted into the post-event period".[13] This clearly supports the statement that there are clear disparities in disaster response behaviours and resilience associated with demographic, socioeconomic, and topographical characteristics.[14]

Basically, the existing urban and digital inequalities deepen in an emergency scenario. This gives more reasons to connect the unconnected, to incorporate to Big Data analysis information that is representative of all urban dwellers, like mobile data, and reinforces the idea of planning. Monitoring of community activity before an emergency enables real-time policy actions that are context-tailor.

Additional efforts have been made to take action for the inclusion of underrepresented communities and places in data gathering, thus in policy actions (see policy brief "[Data gathering as a transformative process for the common good](#)").

Public leadership, partnership, innovation and responsibility

LRG have a leadership role in efficiently managing emergencies. As already stated, data and digital tools are crucial in this endeavor. [The OECD Digital Government Policy Framework](#) explores in detail the facets of a data-driven government where governances, public value, and trust are key elements to "govern data as a key strategic asset in generating public value through their application in the planning, delivering and monitoring of public policies".[15] In an effort to maximize the opportunities and benefits from new and emerging uses

inclusion of unrepresented and marginalized communities. In emergency situations women, migrants and refugees and low-income communities experience the highest risk.

4. **Promote collaboration across all sectors and actors to source better data.** LRGs should develop a clear collaborative strategy around data collection practices, including practices such as crowdsourcing and incentives for sharing data. The plan should link stakeholders, the community, the academy, and the private sector to gather and process data. Building platforms and shared databases among neighboring municipalities and metropolitan spaces is a practical and highly effective strategy for responding in a coordinated way to emergencies. Working toward this kind of platform not only means support to policymakers to react effectively to emergencies at the local level, but it also means a stepping stone into horizontal and multiscalar coordination.

of data while responsibly managing potential risk and harms, the New Zealand government created the Data Ethics Advisory Group. An independent entity to ensure ethical use of data while serving as a controlled space o test ideas, policies, and proposals related to new and emerging data uses.

According to UN-Habitat, data governance considers who makes decisions, how they are made, and how the decision-makers are held accountable for the collection, use, sharing, and control of data, which is often owned by various institutions.[15] Here are showcase two meaningful experiences on how to leverage governance to create an innovative data-driven solutions:

📁 **Seoul, South Korea.** Smart city model for epidemic prevention. The city of Seoul successfully built epidemiological strategies based on infectious diseases simulations and Mobile Telecommunication Big Data - MBD. It started with social distancing using information technology, it was followed by Test - Trace - Treat and then by strategies to curb the spread of COVID-19.

📁 **Rio de Janeiro, Brazil.** Municipal Urban Information System (SIURB). Originally, this platform term enabled cross-sector communication inside the government. Then it evolves to an ample platform where interaction with communities, NGOs, academies and private stakeholders is possible and contributes to decision-making and emergency management.

References

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