The Need for Data Policy in Times of Crisis *An IDPC CODATA Report Following a Scientific Workshop Held on 22 October 2022 in Leiden, The Netherlands*

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ABSTRACT

Recent events of global impact have led the scientific community to re-evaluate and re-affirm the role of science in crisis situations. In particular, the COVID-19 health emergency required the abrupt (re-)allocation of scientific resources to address a pandemic which had demonstrated the vulnerability of science as well as the essential role data science has in responding to a pandemic. In a digital world, data collection, data processing, and data reuse are critical to science and its use for critical decision-making in society's response. This paper reports a workshop undertaken by the CODATA International Data Policy Committee (IDPC), together with leading international partners, on the role of data policy in times of crisis. A critical investigation of the role of data policy in crisis situations was engaged by a leading group of scientists and data experts representing a wide audience of various scientific disciplines and expertise from inter-governmental organisations. This paper presents preliminary results as to how data policy, specifically designed to address the need for science in crisis situations, can contribute to building a more robust scientific enterprise that is appropriately prepared for and capable of acting with confidence in the urgencies of crises. The workshop identified a need for establishing principles for data policy in times of crisis as developing concrete recommendations to support engagement with the international scientific community and inter-governmental organisations.

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INTRODUCTION

A scientific and policy workshop was organised by the CODATA International Data Policy Committee (IDPC) on 24 October 2022 (Leiden, The Netherlands) on 'The need for data policy in times of crisis. The workshop had the following objectives:

1. To examine the scientific, political, and societal frameworks needed to develop data policy with a view towards addressing crisis situations.
2. To consider the underlying ethical, human rights, and humanitarian frameworks needed to support data policy during crisis situations.
3. To support the development tools that promote the responsible practice and use of data when generating scientific evidence in crisis situations.

In 2013 CODATA established the International Data Policy Committee (IDPC) to examine how the scientific community could work together with the policy community to advance open data policy globally. Within the context of the FAIR Data Principles (Wilkinson et al. 2016) and the move toward open science and digital societies, the IDPC sets out to establish how science can support institutions and society in establishing pathways to ensuring data integrity, data protection, and the highest data utility for the benefit of decision-makers and society at large (CODATA 2019). The aim is to appropriately contextualise and achieve the highest confidence level for data objects and data usage, principally in terms of science. What the FAIR movement in data recognised fundamentally is that data has value, and that value is foremost related to its utility alongside the trust placed in it by the wider society.

In examining data utility within society's increasing reliance on data exploitation for economic goods and political decision-making, the CODATA IDPC recognised that robust data policy is essential to data utility: for ensuring data quality, achieving well-defined objectives in data processing, and applying reliable methodologies to draw verifiable conclusions from digital objects and datasets. The workshop aimed to explore how to apply high standards drawn from these requirements when collecting and processing scientific data in crisis situations. While scientific data collecting and processing and drawing conclusions for decision-making from that data is challenging, data policy in disruptive times is of fundamental importance to a world that perhaps often does not provide lab-like circumstances for scientific investigations. These are frequently the circumstances of most immediate importance to large numbers of people.

Recent pandemics/epidemics (such as COVID-19, Ebola, and MERS), natural hazards (such as droughts in Europe, Africa, China, USA; floods in Europe, USA, Pakistan, and Bangladesh; earthquakes in Papua New Guinea, Peru, Japan), and geopolitical conflicts (such as Ukraine, Afghanistan, Syria, Yemen, Burkina Faso, Haiti) point to the need for increased data comprehensiveness, integrity, and transparency as well as for more robust ethics and scientific frameworks supporting data policy in crisis situations. These crises repeatedly demonstrate just why the scientific community needs to be expeditious in data collection and processing so that evidence-based frameworks can be developed to respond to the crises timely, with alacrity, and with confidence. The speed with which scientists can define objectives, implement data management plans, and curate and share reliable data is crucial to the success of the response.

A key global concern today is the growing need for robust and reliable science in society's preparation and response to crises. At the same time, it is apparent that science may be vulnerable in these same disruptive situations, that it might fall short of expectations, and lose trust. Data collection, processing, use, storage, and re-use are critical elements for creating the evidence base on which the conclusions of science depend. These are scientific conclusions upon which, not only policymakers and politicians rely in their decision-making, but also healthcare infrastructures, defence strategies, business, manufacturing, and finance.

Data policy provides an over-arching set of rules, principles, and guidelines that underpin frameworks for how science engages and makes use of the data, including data governance, data quality, and data architecture. Data policy establishes guidance regarding the objectives and methods of collecting, ordering, and processing digital objects. It establishes standards for assuring the quality and reliability of data needed to drive evidence-based scientific conclusions and, ultimately, decision-making based on these conclusions. Data policy should also act as a

tool for securing governance and ethical acceptability of the interoperability and reuse of data in different domains.

Therefore, there is a need for data policy that provides guidance for ethical, robust, and timely data generation in times of crisis within frameworks that ensure the greatest scientific and public utility of the data. The workshop suggested that guidance could also help to define innovative and robust data-sharing models developed for data interoperability and data sharing between researchers in different disciplines and different localities. Data policy is critical for addressing the scientific, political, and societal environments that affect the sharing of data resources, including data objects and data infrastructures, in situations of health emergencies, natural disasters, and geopolitical disruptions that threaten the exchange of scientific knowledge and inter-institutional collaboration.

Crises that pose a crucial risk for humanity such as COVID-19, urge policymakers and authorities to take measures for maximum benefit to the maximum number of people as soon as possible. For the decisions to be precise and target-specific, they should base on scientifically proven evidence. The urgency of a crisis could too easily lead to overlooking essential elements of the responsible conduct of research, fundamental rights, and essential elements of data integrity. Data policy for these situations of urgency needs to be developed in advance in order to ensure a robust preparation and response.

The World Health Organization (WHO) has recognized these issues and has stated that whilst disease outbreaks and other acute public health risks are often unpredictable and require a range of responses, the International Health Regulations (IHR) provide an overarching legal framework that defines countries' rights and obligations in handling public health events and emergencies that have the potential to cross borders (WHO 2005). Importantly, these Regulations are an instrument of international law that is legally-binding on 196 countries, including the 194 WHO Member States. Beginning early in 2020 with the onset of the COVID-19 pandemic, the need for reliable and shared health-related data was essential and delivered via the International Health Regulations mechanisms and summarised in the WHO Coronavirus (COVID-19) Dashboard (WHO 2023). However, it has not been possible to identify similar shared mechanisms documenting impacts in timely ways. Recognizing these complexities, data policy for crisis response needed to be further pushed to the fore. This is, not only for the needs of science during a crisis, but principally to address the dire impacts of crisis situations on public health as well as wider societal and economic impacts to which crises all too often give rise.

The workshop also considered that flawed data serves as fuel for infodemics that almost immediately gain strength in echo chambers of social media and harm society's trust in science. The large amount of retracted research from open-science platforms during the COVID-19 pandemics demonstrates the need for a more careful and thorough approach to data policy in crisis situations: the urgency and even chaos of a crisis do not justify non-compliance with scientific and ethics standards of responsible conduct of research. Data integrity and reliability remains a vital cornerstone for scientists and policymakers when investigating and managing crises. Developing appropriate data policies in advance of a crisis and welcoming flexibility in existing data policies is a key to the responsible, timely, and accurate management of public health emergencies.

Data policy designed to advance science in crisis situations should, if it is to achieve its greatest benefit for present and future crises, also contribute to open sharing, seamless access, interoperability, and the re-use of reliable data and other digital objects in trusted and open distributed environments where scientists can collect, find, process, publish, and re-use one another's data and digital tools and services. More discussion and work are needed to define and develop a data policy strategy appropriate to situations of fundamental disruption to societal infrastructures if we are to ensure the robust scientific evidence needed to respond to crises as they arise as well as prepare for future crises.

LINKING THE 2015 UN LANDMARK AGREEMENTS TO THE NEED FOR DATA POLICY IN MAPPING CRISES

The year 2015 became a milestone for several United Nations Landmark Agreements, including the Sendai Framework for Disaster Risk Reduction 2015–2030 (SFDRR), the Paris Agreement

for Climate Action, and the Sustainable Development Goals (SDGs). Common and clear global targets were established, with of key importance on reduced mortality, reduced economic losses, and reduced inequalities. The Sendai Framework introduced an important monitoring mechanism to observe the process of how the commitments by the signatory countries would be monitored (Sendai Monitoring). It also provided an opportunity to connect the SDGs to measurable Sendai Framework targets and follow their progress (SFDRR 2015; Sendai Monitoring 2023; The Paris Agreement 2015).

In 2023 the Sendai Framework team will publish a midterm review of their target achievements by the signatory countries regarding disaster policies. This will provide a first overview of the value of these well-defined targets as well as learnings from the progress made in in measuring our commonly agreed indicators. Previous agreements paved the way, such as the Yokohama Strategy and the Hyogo Framework for Action. However, these earlier agreements did not include the monitoring of indicators. The Sendai Framework seeks to reflect clearly defined outcomes in terms of loss and damage. It employs both quantitative indicators and qualitative data to ensure reliable indicators, which enables benchmarking across time and localities, measuring progress against a well-defined baseline (CODATA 2019).

In this way, the Sendai Framework contributes reliable statistics to measure global progress toward achieving the UN SDGs. To date 155 countries have met their annual reporting expectation at least once for half or more of the seven Sendai targets. Still 40 countries have yet to report. Now it is intended that the annual Sendai Framework reporting frameworks will be used for decision-making in climate and agriculture policy as well as creating matrixes for different integrations: e.g., the New Urban Agenda and the Doha Program of Action both use shared indicators of the Sendai Framework. All of these are supported by ongoing improvement and terminology of disaster-related statistics that contribute to more accurate and efficient monitoring.

The ontologies and taxonomies of all hazards are critical to the scientific community's ability to contribute to policies that mitigate crises. The Sendai Framework for the first time defined 302 hazards for the global community, hazards that could be thus identified, measured, and monitored (UNDRR 2022). This classification presents a state-of-the-art and comprehensive tool for use by the disaster community when deciding on policies before any event occurs.

DATA POLICY IN DECISION-MAKING FOR CRISIS SITUATIONS

The workshop demonstrated that data policy for crisis situations is of vital importance for building the infrastructure of our increasingly digital societies, including their digital economies and digital communication platforms. Scientific innovation and communication depend increasingly on how digital objects are shared, interpreted, and communicated to experts and the general public alike. In situations of urgency, of disruption, or disaster, the scientific community as well as decision-makers require robust data policy to achieve reliable conclusions and public trust.

The workshop concluded that the construction of a robust data policy for crisis situations should address the following questions:

1. How can data policy contribute to a shared understanding of the role of open science in crisis situations at the local, national, and international frameworks of science and science policy?
2. In what way can data policy promote collaboration and communication in science and society while contributing to frameworks and tools that prepare for and respond to crises?
3. How should data policy be devised for crisis preparation and response such that it is adaptable to specific legal, cultural, and national/regional environments?
4. How can data policy contribute to enhancing open science data resources in times of crisis?
5. How can data policy contribute to the UN SDGs and more resilient societies that mitigate one another's weaknesses while sharing science to strengthen our crisis infrastructures for preparedness and response? (The UN)

These questions and the discussion from the workshop pointed to the need for data policy principles that support data science in times of crisis. The international experts participating in the CODATA IDPC workshop agreed to build on the outcomes of their discussions and explore further opportunities for collaborative learning and working with the objective of defining principles and establishing recommendations for data policy in times of crisis.

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COMPETING INTERESTS

The authors have no competing interests to declare.

AUTHOR CONTRIBUTIONS

Virginia Murray, Francis P. Crawley, and Burcak Basbug Erkan developed the workshop programme with input from the CODATA Executive Committee, the CODATA IDPC, and the conference organisers. Burcak Basbug Erkan provided the initial draft of the paper, which was reviewed and revised by Virginia Murray and Francis P. Crawley. Perihan Elif Ekmekci provided substantial comment and revision to a draft of this paper. The paper was then shared and commented upon by the workshop presenters.

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