CONVERGE COVID-19 Working Groups for Public Health and Social Sciences Research

Research Agenda-Setting Paper

This paper was written to help advance convergence-oriented research in the hazards and disaster field. It highlights areas where additional research could contribute new knowledge to the response to and recovery from the pandemic and other disasters yet to come. Questions about the research topics and ethical and methodological issues highlighted here should be directed to the authors who contributed to this paper.

Working Group Name:

Technology, Policy, and the Public Sector in the COVID-19 Environment

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Working Group Description:

Digital technology and new forms of digital information have the potential to assist the COVID-19 response in the short term and change the nature of public sector work, including emergency management, over the long term. This Working Group explores these shifts as well as how digital technology (e.g., smartphones, remote work, digital collaboration, new sources of information) impacts thinking.

Priority Research Topics and Specific Research Questions:

Our Working Group used a series of facilitated exercises designed for idea generation in cross-disciplinary teams to compile a set of integrative topics and associated research questions. Each topic addresses the following overarching question: *"What are the most important public sector concerns regarding the use of technology to respond to disasters during the COVID-19 crisis?"* We view disaster management as a socio-technical system in which individuals, organizations, technology, and information are parts of an interconnected whole. The topics and research questions blur disciplinary and methodological boundaries and strive to address issues at the intersection of disaster management practice, research, and theory. The questions straddle digital technologies with phenomena at multiple levels of analysis, including the socio-cognitive, organizational, political, and cultural phenomena and cover the full cycle of crises: preparation, response, and recovery.

Priority Research Topics	Potential Research Questions
1. *Distributed Problem Solving:* Addresses joint / collaborative complex problem solving using the capacities of distributed human networks enabled by networked digital technologies.	• Research Question 1: What collaborative framework is needed for distributed problem solving? What are the distinguishing features of this collaborative framework? What problems are well suited for collaborative and distributed problem solving? What groups of people are most and least able to participate? • Research Question 2: What new forms of problem solving are possible in a more distributed environment? How much does their novelty reflect new mixes of participants or new uses of tools (some of which may be new)? How can public sector interventions build bridges across silos and gaps in the distributed environment?

	• Research Question 3: What institutions are brought into addressing problems? How do their different decision-making practices and organizational rules influence their interpretation of a problem or ways of addressing it? • Research Question 4: Which forms of expertise are prioritized by emergency managers and policymakers in their decision-making? Are there any forms that are explicitly discounted by these officials? • Research Question 5: What roles should the public sector, private sector, and NGOs play in promoting citizen science in emergency management? How might community leaders coordinate and communicate with the public sector, private sector, and NGOs to advocate for and/or establish community-based citizen science in emergency management? • Research Question 6: How does the increased use of digital public space (social media, commercial transactions, entertainment, group communication) change public sector deliberation? How does it change emergency management? • Research Question 7: How can knowledge be integrated in a distributed problem solving setting? How should organizational structures and routines be redesigned for knowledge integration to address problems? How might research on the science of team science and computer supported cooperative work be applied to the public sector, including crisis management? • Research Question 8: How is community collective action being organized via social media and social networking sites?
2. *Data Governance:* Addresses norms, principles, rules, policies, processes, roles, and responsibilities for governing various types of data.	• Research Question 1: What do organizations and communities define as data in managing disaster? Who are the audiences for different data representations? What are the practices for making data public, linking databases, or keeping data private? What skills, knowledge, as well as roles, do data governance systems require? • Research Question 2: How can open data be used to address the COVID-19 crisis? How has it been used, and what lessons can be learned from activity at different levels (community, state, national, and international)? • Research Question 3: How much and what kinds of data should be released on the COVID-19 cases, considering transparency and the privacy of the infected? Who should have access to what kinds of data—and who has had what access? • Research Question 4: What efforts are being made (or what efforts should be made) to hide Personally Identifying Information (PII) while also accurately representing COVID-19 data, especially for persons of color? Have any known privacy-preserving techniques been used, and has there been any evaluation of such uses?
3. *Cognitive Processing of Digital Information:* Addresses lower and higher order cognitive processes such as attention, memory, comprehension, learning, thought, and language in the digital environment of disaster management.	• Research Question 1: How do public managers work with intelligent tools and technologies (e.g., smartphones, smart assistants, Internet, GPS, drones, object and facial recognition, chatbots, and more)? What cognitive processes do they offload onto these tools and under what conditions? What are the consequences of this type of cognitive offloading (including sub-optimal decisions and automation biases)? What are the longer-term cognitive and behavioral consequences of working with AI, including learning and problem solving? What are the implications for managerial decision-making? • Research Question 2: How do emergency managers understand and respond to the competing demands of both COVID-19 and emerging disasters such as wildfires or weather-related emergencies in their communities? How do they prioritize these competing demands?

	• Research Question 3: What are the short and longer-term cognitive, affective, and behavioral impacts of digital information overload and stress on critical thinking and decision-making?
4. *Socio-Technical Organizational Systems Design:* Addresses the structures, practices, routines, standards, and institutional arrangements in socio-technical organizational systems.	• Research Question 1: What policy changes have been made at the local level to ensure best practices from the pandemic have been incorporated into existing emergency management planning/policy, and what are the challenges with this incorporation? • Research Question 2: How (and by whom and for whom) are new/emerging technologies promoted during crises? How sustainable are they in the long term? • Research Question 3: How do interpretations of legal processes organize COVID-19 responses? Which legal concerns generate the most constraints (e.g., privacy protections, restrictions on data sharing or data combining)? What actors and institutions are involved? How? • Research Question 4: How might we design "fault tolerant" organizational systems to better process digital information and enhance collective organizational knowledge? • Research Question 5: How could new technologies be used to reengineer government processes in emergency management? Given past uses of new technologies in government, how can the opportunities be segmented in terms of old/legacy systems, contemporary but vanilla systems, specialized technology, open technology, or other alternatives? • Research Question 6: What new materials and technologies should be prioritized for investment and deployment to address the COVID-19 crisis? • Research Question 7: How big a problem is cybersecurity during a period of increased work from home, how do we know, and what can be done to mitigate the greatest threats and vulnerabilities? • Research Question 8: What new structures (inter-sectoral, inter-agency, cross-governmental) need to be created to defend against global health security threats? Can we translate / expand on planning concepts from military planning to microbial defense? • Research Question 9: How have emergency managers and/or local governments prepared for the contrasting priorities in managing COVID-19 like physical distancing, and managing emergency response that requires storm shelters, which would violate physical distancing recommendations?
5. *Communication:* Addresses disaster communication in online spaces	• Research Question 1: What biases in emergency risk communication emerge through social networking sites (SNS)? Which populations receive messages, and which do not? How can SNS communication be made more equitable? • Research Question 2: How should information about the COVID-19 crisis be contextualized and communicated to the public in an environment of fragmented attention? • Research Question 3: What methods of communication are most effective for COVID-19 related communication (TV, social media, transit system information, etc.)? • Research Question 4: What are the barriers to translating medical/epidemiological information into information for public consumption? What role do language, cultural sensitivities, and norms play?

6. *Structural Inequities:* Addresses impacts of systemic inequities in access to digital information and technologies and ways to address them.	• Research Question 1: How does differential access to technology influence response capacity across demographic and organizational segments of society? • Research Question 2: How does lack of capacity influence the use of technology among government officials, even as they have access to technology? • Research Question 3: How can public institutions address potential inequities in the response to COVID-19 in advance? (e.g., contact tracing, testing, and medical care) • Research Question 4: How are communities without (reliable) internet access receiving information? What do they miss? How do/should we close that gap (e.g. with text messages, other forms of communication)?

Ethical / Methodological Considerations:

Our Working Group raised a number of entangled ethical and methodological questions. First, ethical issues in technology in the public sector need to be understood empirically rather than prescriptively. Beyond the obvious ethical issues concerning privacy, access, and equity, the *ethical dimensions of acting or not acting on behalf of the public,* rather than merely as an individual are less understood and can be uncovered through ethnographic studies. Closely related to the ethical dimensions of decision-making is understanding and defining *transparency* in the context of intelligent machines and digital information. How does the amount, quality, presentation and contextualization of information shape thinking and decision-making? How might we design transparent information systems? How do *autonomy and bureaucratic discretion* affect information transparency? Third, how do *ideological frameworks* like individualism, capitalism, and democracy influence planning for pandemics as well as the implementation of those plans? Fourth, how is pandemic response shaped by *international politics, competition, statecraft, and strategy*? Fifth, how might translation science research and science of team science inform disaster management? Specifically, how can knowledge about inter-sectoral and cross-disciplinary collaboration apply to disaster planning and practice? Finally, how do uncertainty and performative security (e.g., thermal imaging and temperature checks, putting up plexiglass in office buildings) intersect at the individual, organizational, local, state, and national levels?

Other Frameworks, Considerations for Collaboration, and/or Resources:

Misra, S., Roberts, P., & Rhodes, M. (2020). The Ecology of Emergency Management Work in the Digital Age. *Perspectives on Public Management and Governance*. Available at: https://academic.oup.com/ppmg/article-abstract/doi/10.1093/ppmgov/gvaa007/5758068

Misra, S. & Wernstedt, K. (2020). NSF RAPID: Distancing and Digital Information in the Face of COVID-19 https://www.nsf.gov/awardsearch/showAward?AWD_ID=2028242&HistoricalAwards=false

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This COVID-19 Working Group effort was supported by the National Science Foundation-funded Social Science Extreme Events Research (SSEER) network and the CONVERGE facility at the Natural Hazards Center at the University of Colorado Boulder (NSF Award #1841338). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the NSF, SSEER, or CONVERGE.