Do no harm: A taxonomy of the challenges of humanitarian experimentation

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Abstract

This article aims to acknowledge and articulate the notion of "humanitarian experimentation". Whether through innovation or uncertain contexts, managing risk is a core component of the humanitarian initiative – but all risk is not created equal. There is a stark ethical and practical difference between managing risk and introducing it, which is mitigated in other fields through experimentation and regulation. This article identifies and historically contextualizes the concept of humanitarian experimentation, which is increasingly prescient, as a range of humanitarian subfields embark on projects of digitization and privatization. This trend is illustrated here through three contemporary examples of humanitarian innovations (biometrics, data modelling, cargo drones), with references to critical questions about adherence to the humanitarian "do no harm" imperative. This article outlines a broad taxonomy of harms, intended to serve as the starting point for a more comprehensive conversation about humanitarian action and the ethics of experimentation.

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Introduction

This article aims to further existing work around the notion of "humanitarian experimentation" connected to the use of new digital technology and related data production. Firstly, it does so by conceptualizing humanitarian experimentation as a form of practice that can now be identified across a range of humanitarian subfields. In these fields, the application of digital technology/data in different ways echoes experimental sentiments which the humanitarian community prefers to think of as belonging to a distant colonial/postcolonial past. With reference to three contemporary examples, it is illustrated how an experimental approach pertains, albeit in relation to new types of innovations (biometric registration of refugees, data modelling of Ebola health data and transport of blood samples and medication using drones) – and how this raises critical questions about adherence to the humanitarian "do no harm" imperative.[1] To encourage and support a

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1 The seminal contribution is Mary B. Anderson, *Do No Harm: How Aid Can Support Peace or War*, Lynne Rienner, Boulder, CO, 1999. For a recent foundational text, see Hugo Slim, *Humanitarian Ethics: A Guide to the Morality of Aid in War and Disaster*, Oxford University Press, Oxford, 2015.

more structured conversation about humanitarian experimentation, the article then develops a taxonomy of potential harms.[2]

Experimentation is a description of a defined, structured process to test and validate the effect and effectiveness of new products or approaches. Humanitarian work, due to its uncertain and often insecure context, is by nature experimental. Using well-known and tested approaches – technological, medical, nutritional or logistical, for example – in an uncertain environment does not make that practice experimental, though it may introduce risk through the variability of the context of its application. However, the use of untested approaches in uncertain environments provokes a need for more structured processes: it compounds the risk of experimental practice with the risks of unstable environments, raising the potential for experimentation to conflict with, rather than innovatively bolster, humanitarian principles and practices. At present, this type of practice can be observed with respect to many forms of humanitarian technology and humanitarian action based on the use of digital data. Yet, these practices are commonly framed in a humanitarian innovation language in which the possibility that humanitarian principles could be compromised is omitted. Nearly every other industry in the world with this kind of impact on human beings requires proof of impact and assessment of harms prior to deploying new technologies at scale. So, the more proven something is, the larger the human impact it is able to have. This is not happening with technological and data-driven approaches to humanitarian action.

This analysis is timely because we are witnessing a rapid datafication and digitization of humanitarian action. The widespread adoption of datafication significantly impacts the range and scale at which experimental "innovation" practices affect humanitarian action.[3] As part of this, the privatization and digitization of humanitarian action is on the rise, which invites a potentially adverse combination of commercial incentives, ethical standards and operational priorities into the fragile environments of humanitarian response.[4] This article is

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2   For the foundational scholarly work on this topic, see Katja Lindskov Jacobsen, "Making Design Safe for Citizens: A Hidden History of Humanitarian Experimentation", *Citizenship Studies*, Vol. 14, No. 1, 2010; Katja Lindskov Jacobsen, "Experimentation in Humanitarian Locations: UNHCR and Biometric Registration of Afghan Refugees", *Security Dialogue*, Vol. 46, No. 2, 2015; Katja Lindskov Jacobsen, *The Politics of Humanitarian Technology: Good Intentions, Unintended Consequences and Insecurity*, Routledge, London, 2015; Sean Martin McDonald, "Ebola: A Big Data Disaster: Privacy, Property, and the Law of Disaster Experimentation", CIS Paper Series, Vol. 1, Centre for Internet & Society, 1 March 2016, available at: cis-india.org/papers/ebola-a-big-data-disaster (all internet references were accessed in August 2017); Kristin Bergtora Sandvik, Maria Gabrielsen Jumbert, John Karlsrud and Mareile Kaufmann, "Humanitarian Technology: A Critical Research Agenda", *International Review of the Red Cross*, Vol. 96, No. 893, 2014.

3   The authors conceptualize datafication as the conversion and articulation of information, concepts, processes or systems in mathematical and machine-readable formats. Datafication happens at multiple levels and includes elements ranging from basic objects such as proxy indicators all the way through to complex systems like artificial intelligence. The term "datafication", however, specifically points to the practice of trying to express all factors relevant to a subject as data.

4   The authors conceptualize digitization as the conversion, articulation and management of historically analogue information, processes and actions through digital tools.

an explicit recognition that an increasingly broad range of humanitarian practices can be understood as experimental, with the important implication that this framing highlights the significance of understanding how these practices may succeed or fail in ways that can cause real human harm.

This article takes as its point of departure the authors' multidisciplinary work within law, legal anthropology and international relations. It starts from a common concern about how the contemporary humanitarian context of emergency, exceptionality and exigency is sometimes being exploited to give license to humanitarian responders, governments and private-sector interests to experiment more or less explicitly in these chaotic emergency contexts. This tendency is particularly pronounced within the current humanitarian innovation paradigm, broadly defined.[5] The objective of this article is to show how "humanitarian innovation" can be regarded as "experimental" in a problematic sense, although it is currently not recognized as such. To this end, the three cases of humanitarian innovation presented here are used to illustrate in what way these innovative practices are "experimental" and how this can have potentially harmful consequences for the implicated humanitarian subjects. What the cases suggest is that rather than belonging to a distant past, the tendency for humanitarianism to be experimental in the sense of allowing for and even encouraging the use of untested approaches has made its way into new domains; it is no longer only about more familiar examples such as the trialling of new medical inventions in various humanitarian contexts. In order to necessarily give greater priority to discussions about ethics and the "do no harm" principle, "humanitarian innovation" should give more prominence to considering these experimental tendencies. This includes conversations about how "humanitarian innovation" can conform to – rather than conflict with – humanitarian principles. It also articulates the need for conversations about humanitarian innovation to include protecting the implicated subjects from knowable harm.

The article proceeds in five main steps. The first part briefly sets out an understanding of what is at stake for the humanitarian community. The second explores how the historical and colonial legacies and contemporary social constructions of emergency and urgency shape the orthodoxies and trade-offs of contemporary humanitarian innovation practices. The third part presents three examples of experimental humanitarian innovation: biometric registration of refugees, Ebola data modelling and the use of cargo drones to transport medication and blood samples in Africa. To better understand the vulnerability and harm that

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5   As noted by Nielsen, Sandvik and Jumbert, humanitarians currently use the term "humanitarian innovation" to describe how technologies, products and services from the private sector and new collaborations can improve the delivery of humanitarian aid. This implies that humanitarian innovation can refer to anything, from product innovation (such as new water filters) to service innovation (such as cash transfers or fuel supply) and process innovation (such as new monitoring and evaluation procedures for humanitarian staff). See Brita Fladvad Nielsen, Kristin Bergtora Sandvik and Maria Gabrielsen Jumbert, "How Can Innovation Deliver Humanitarian Outcomes?", PRIO Policy Brief No. 12, PRIO, Oslo, 2016.

may arise both from and beyond these topical examples, the fourth step is to develop a two-tiered taxonomy of potential harms to beneficiaries and humanitarian organizations. These include the distribution of harm, conceptualizations of resources and resource scarcity, and legal liability and reputational damage. The fifth and final step is to measure harm against humanitarian imperatives and principles. Based on the ethical concerns drawn out from the cases and harm taxonomy, the article concludes by reflecting on the need for an ethics of humanitarian experimentation.

What is at stake?

The unique, elevated status that is often afforded to humanitarian action is commonly predicated on the belief that humanitarian practices adhere to a set of established principles, in order to aid and protect communities in need. The International Committee of the Red Cross (ICRC) protection policy emphasizes the imperative to ensure that its action does not have adverse impacts on, or create new risks for, individuals or populations.[6] This "do no harm" imperative is fleshed out in the first protection principle of the Humanitarian Charter and Minimum Standards in Humanitarian Response, emphasizing the need to "avoid exposing people to further harm as a result of your actions".[7]

Those involved in humanitarian responses must take steps to avoid or minimize any adverse effects of their intervention, in particular the risk of exposing people to increased danger or abuse of their rights. This principle includes the following three elements: that the form of humanitarian assistance and the environment in which it is provided do not further expose people to physical hazards, violence or other rights abuse; that assistance and protection efforts do not undermine the affected population's capacity for self-protection; and finally that humanitarian agencies manage sensitive information in a way that does not jeopardize the security of the informants or those who may be identifiable from the information.[8] Yet these principles conflict with innovation when innovation is carried out in an experimental manner, with potentially harmful consequences for those to whom humanitarianism claims to offer protection. In other words, it is suggested that as an indirect consequence of uncritically adopting a terminology of "humanitarian innovation", we may fail to acknowledge the experimental nature of projects and practices referred to as "innovation", thereby ignoring or undervaluing the risks posed to humanitarian subjects.

6   ICRC, "ICRC Protection Policy", *International Review of the Red Cross*, Vol. 90, No. 871, September 2008, p. 753, available at: www.icrc.org/en/download/file/20806/irrc-871-icrc-protection-policy.pdf.
7   Sphere Project, Humanitarian Charter and Minimum Standards in Humanitarian Response, Protection Principle 1, available at: www.spherehandbook.org/en/protection-principle-1-avoid-exposing-people-to-further-harm-as-a-result-of-your-actions/.
8   *Ibid.*

The rise of innovation: Historical legacies, constructions of emergencies

Humanitarian innovation

"Innovation" has become a significant buzzword in the humanitarian field, appearing in institutional initiatives, donor speeches, policy documents and media coverage.[9] While the discussions of the humanitarian innovation ecosystem speak to great expectations about what innovation can do for humanitarian action, so far there has been limited critical scholarly interest in the individual, organizational and systemic trade-offs and potential harms this agenda may espouse.[10] Some critical attention has been paid to whether the humanitarian innovation agenda represents a form of imperialism or a neoliberal market strategy[11] and whether the experimental nature of humanitarian innovation implies that complex political problems are reduced to matters to be fixed through technical and aesthetic solutions.[12] However, there has been little discussion that critically analyzes the relationship between "innovation" and humanitarian principles.

This article argues that there is a need to acknowledge that innovation is often used as a proxy for invention and experimentation, with more tangible, but in this context less understood and addressed, impacts on humanitarian subjects and humanitarian work. More attention must be paid to market dynamics, and how invoking "innovation" has become a competitive advantage that obviates the scrutiny which would otherwise accompany proposals. In this way, the article offers a reframing of emergent discussions about the ethics of humanitarian innovation. It is argued that the labels, actors and discourses of experimental practices have shifted to become centred on humanitarian innovation, goods and design. In the humanitarian sector, new projects and designs are construed as "innovations" with testing phases, while the notion of experimentation is usually avoided. Particular attention must be paid to the flawed nature of the data experimentation cycle in humanitarian emergency settings. While treatment,

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9 See, for example, *One Humanity: Shared Responsibility*, Report of the Secretary-General for the World Humanitarian Summit, UN Doc. A/70/709, 2 February 2016; United Nations Office for the Coordination of Humanitarian Affairs (OCHA), *Leaving No One Behind: Humanitarian Effectiveness in the Age of the Sustainable Development Goals*, OCHA Policy and Studies Series, 1 February 2016, available at: www.unocha.org/node/214196.

10 Kristin Bergtora Sandvik and Kjersti Lohne, "The Rise of the Humanitarian Drone: Giving Content to an Emerging Concept", *Millennium – Journal of International Studies*, Vol. 43, No. 1, 2014; Tom Scott-Smith, "Humanitarian Neophilia: The 'Innovation Turn' and its Implications", *Third World Quarterly*, Vol. 37, No. 12, 2016; Kristin Bergtora Sandvik, "Humanitarian Innovation, Humanitarian Renewal?", *Forced Migration Review*, September 2014.

11 Cedric Johnson, "The Urban Precariat, Neoliberalization, and the Soft Power of Humanitarian Design", *Journal of Developing Societies*, Vol. 27, No. 3–4, 2011; Anke Schwittay, "Designing Development: Humanitarian Design in the Financial Inclusion Assemblage", *PoLAR: Political and Legal Anthropology Review*, Vol. 37, No. 1, 2014.

12 Samer Abdelnour and Akbar M. Saeed, "Technologizing Humanitarian Space: Darfur Advocacy and the RapeStove Panacea", *International Political Sociology*, Vol. 8, No. 2, 2014; Peter Redfield, "Fluid Technologies: The Bush Pump, the LifeStraw® and Microworlds of Humanitarian Design", *Social Studies of Science*, Vol. 46, No. 2, 2016.

service provision and aid delivery remain key objectives of these processes, the experimental nature of these systems now commonly entails a significant element of data extraction and management.[13]

Innovation scholarship has a long historical pedigree, as innovation theory emerged as a distinct academic discipline almost a century ago.[14] This article focuses on a much narrower issue – namely, how the specific attributes of the humanitarian setting, past and present, have contributed to the rise of experimental innovation. To that end, the following sections set the stage for the three examples and harm analysis by considering the ways in which the imperial, conceptual and interest-based contexts of the humanitarian innovation paradigm help to construct the contemporary *modus operandi* of humanitarian innovation.

Colonialism, technology and science

Not only historical but also contemporary humanitarian innovation specifically, and humanitarianism more generally, cannot be understood apart from a history of experimentation in the domains of science and technology. As noted by Lock and Nguyen, the historical European and North American portrayal of technological innovation as a narrative of progress and of the betterment of individual and social life has been premised on an unreflective acceptance of technological innovation in which the relationship of humans to technology is perceived as too obvious to need examination. Indeed, technology is perceived as a powerful and autonomous agent, inherent to progress.[15] In many ways, technology – assumed to be developed apolitically – becomes the answer to political problems.[16] Technology is seen both as an unquestionable good, and as determinative of the forms that human social life will take. At the same time, material artefacts are often construed as "things", as dispassionate "means" that humans can make use of when seeking to achieve specific, predefined end goals (which for humanitarians are synonymous with benevolent protection and assistance). Put differently, material artefacts are in themselves considered ethically and morally neutral.[17]

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13 Labelling these developments "humanitarian imperialism" does little to unpack their mechanisms and politics. See Bruce Nussbaum, "Is Humanitarian Design the New Imperialism? Does Our Desire to Help Do More Harm Than Good?", *Co.Design*, 7 June 2010, available at: www.fastcodesign.com/1661859/ishumanitarian-design-the-new-imperialism.

14 John Bessant, Ben Ramalingam, Howard Rush, Nick Marshall, Kurt Hoffman and Bill Gray, *Innovation Management, Innovation Ecosystems and Humanitarian Innovation: Literature Review*, UK Department for International Development, 2014, available at: r4d.dfid.gov.uk/Output/196762/.

15 Margaret Lock and Vinh-Kim Nguyen, *An Anthropology of Biomedicine*, John Wiley & Sons, Hoboken, NJ, 2010.

16 According to Segal, "technological utopianism" is a belief in technological progress as inevitable and in technology as the vehicle for "achieving a 'perfect' society in the near future. Such a society, moreover, would not only be the culmination of the introduction of new tools and machines; it would also be modeled on those tools and machines in its institutions, values and culture." See Howard P. Segal, "The Technological Utopians", in Joseph J. Corn (ed.), *Imagining Tomorrow: History, Technology and the American Future*, MIT Press, Cambridge, MA, 1986.

17 M. Lock and V.-K. Nguyen, above note 15.

Attention must also be given to the crucial role of science in the establishment of colonial and postcolonial development regimes.[18] Scientific research and investigations were both technical and political experiments that played a role in political transformations.[19] This research was often carried out through a colonial *modus* of data extraction, where fieldwork research presupposed compliant subjects, ready to answer numerous questions and accept intrusions into their lives.[20] At the same time, experimental colonial and postcolonial endeavours in foreign territories and on foreign bodies also played a role vis-à-vis the testing of new technologies and the desire to make them safe for use by more valued citizens, often located in metropolitan States.[21] As observed by Rottenburg, "One of the significant aspects of the age of imperialism was the use of the colonies as vast experimental terrains where all kinds of unproven technologies could be tested."[22] What can be seen today is that "states of exception", which are justified with reference to the urgency of humanitarian situations, are seized on in order to "warrant political, medical and health experiments"[23] – and with this, certain "forms of domination" manifest themselves, in particular across the African continent. Additionally, whilst curing the ills of local populations was (and still is) one rationale for such medical interventions, it must also be appreciated that biomedicine was at the same time considered crucial to preserving the health of imperial armies and settlers in the face of deadly tropical diseases.

With this in mind, the argument put forth here is that the innovation trajectories of contemporary population management (through biometrics, big data and drone delivery) must be understood in relation to this historical legacy. Today, experimental populations in the global periphery can be seen as contemporary "theatres of proof" in which statistical technologies choreograph the performance.[24] The controversy over placebo use in Africa in 1994 during trials of short-course azidothymidine treatment, used to halt perinatal transmission of HIV, was a watershed in the debate over ethical standards in global clinical research, and showed how framing a problem as a public health emergency can suspend some of the normal criteria by which biomedical efficacy is judged.[25] While not driven by datafication in the sense discussed here, the ethical issues that emerged with this

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18 Christophe Bonneuil, "Development as Experiment: Science and State Building in Late Colonial and Postcolonial Africa, 1930–1970", *Osiris*, Vol. 15, 2000.

19 Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870–1950*, University of Chicago Press, Chicago, IL, 2011.

20 C. Bonneuil, above note 18.

21 K. L. Jacobsen, "Making Design Safe for Citizens", above note 2.

22 Richard Rottenburg, "Social and Public Experiments and New Figurations of Science and Politics in Postcolonial Africa", *Postcolonial Studies*, Vol. 12, No. 4, 2009.

23 Lydie Cabane and Josiane Tantchou, "Measurement Instruments and Policies in Africa", *Revue d'Anthropologie des Connaissances*, Vol. 10, No. 2, 2016.

24 M. Lock and V.-K. Nguyen, above note 15. See also Megan Vaughan, *Curing Their Ills: Colonial Power and African Illness*, Stanford University Press, Stanford, CA, 1991.

25 Adriana Petryna, *When Experiments Travel: Clinical Trials and the Global Search for Human Subjects*, Princeton University Press, Princeton, NJ, 2009; Claire L. Wendland, "Research, Therapy, and Bioethical Hegemony: The Controversy over Perinatal AZT Trials in Africa", *African Studies Review*, Vol. 51, No. 3, 2008.

controversy are highly significant as a backdrop for the present analysis. With respect to biometrics, the cradle of the modern fingerprinting system was colonial India, where British administrators were concerned with maintaining control over the native population.[26] It was in the colonies that identity cards were first designed and issued, while fingerprinting was first used in Bengal, to ensure that only certified pensioners were collecting their monthly remuneration, and only once.[27] In the present, digital biometric fingerprint technologies have been trialled in various humanitarian settings since the early 2000s. Amongst the rationales for these trials are donor concerns about "questionable refugee population figures" that biometric registration is expected to be able to curb by providing more accurate counts, which presumably would result in lower population figures and hence in smaller amounts of funding requested from donors.[28] Furthermore, historically, technological innovations that lowered the economic and human cost of penetrating, conquering and exploiting new territories and new populations were preconditions for imperialism. Air power was crucial because it offered speed, predictability and an unrivalled view from above, with minimal infrastructure needs.[29] Contemporary drone discourse mirrors previous thinking on colonial air power in significant parts, as the global South and Africa in particular are construed as a site of intervention where drones are portrayed as the solution to the problems of ill health, poverty and immature markets.[30]

The constructions of emergency and urgency

The dynamics that characterize emergency contexts and the vulnerability of affected populations must necessarily determine how humanitarians approach innovation and experimentation cycles, insofar as these characteristics distinguish humanitarian contexts from how other professions manage and regulate similar processes. In non-emergency contexts, there are structured processes for the testing, validation and application of new products. Within predetermined parameters, such processes define the nature and scope of cost-benefit considerations, including standards for preparedness, effectiveness and risk-taking. The emergency context introduces fundamentally new equations to the experimentation/innovation cycle.

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26 Simon Cole, "History of Fingerprint Pattern Recognition", in Nalini Ratha and Ruud Bolle (eds), *Automatic Fingerprint Recognition Systems*, Springer Science & Business Media, New York and London, 2007.
27 R. Rottenburg, above note 22.
28 US Embassy Rome, "WFP'S Collaboration with UNHCR in Providing Food Assistance to Refugees in Tanzania Joint Mission Assessment", 03ROME4672, 2003, available at: wikileaks.org/cable/2003/10/03ROME4672.html.
29 Daniel R Headrick, *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century*, Oxford University Press, New York, 1981; David Killingray, "'A Swift Agent of Government': Air Power in British Colonial Africa, 1916–1939", *Journal of African History*, Vol. 25, No. 4, 1984; David E Omissi, *Air Power and Colonial Control: The Royal Air Force, 1919–1939*, Manchester University Press, Manchester, 1990.
30 Kristin Bergtora Sandvik, "African Drone Stories", *BEHEMOTH – A Journal on Civilisation*, Vol. 8, No. 2, 2015.

Primary among these is the notion that "something must be done", a logic that focuses on the cost of inaction. There appears to exist a perceived imperative whereby civil society continues to deploy largely untested and non-consented interventions in a host of "worst-case scenarios" because trying anything is seen as better than doing nothing.[31] As observed by Calhoun, underpinning the notion of emergency is a specific way of thinking about how the world works, including a particular, if often implicit, moral orientation. Emergency, thus, is a way of grasping problematic events, a way of imagining them in a manner that emphasizes their apparent unpredictability, abnormality and brevity, and which implies that response – intervention – is necessary. Once a humanitarian emergency is declared, it shapes not only who is supposed to act, but also what is supposed to be done, and how.[32] This, in turn, alters notions about acceptable levels of risk. The acceleration or modification of the experimentation cycle, due to the declared emergency context, could in principle be acceptable, but typically only within predefined parameters. With the rise of the humanitarian technology paradigm, this has also increasingly rendered humanitarian problems and protection gaps "technology-solvable".

What is of particular concern is a perceived license to employ lesser standards, both in pre-deployment analyses and in the after-action evaluation of effectiveness. This is not necessarily because lesser standards are required given the specific emergency context, but because of how the underpinning rationale of urgency attends the declaration of an event as an emergency. In zones of crisis and emergency, protection and safety considerations are weighed against assumptions of immediate health benefits or knowledge to be gained. Ethics and methods are often modified to fit the local context and the need for the experiment to deliver specific types of data.[33] Rottenburg suggests that "[t]he systematic link between state of exception, intervention, sovereignty, capital and global markets implies a particular change in the global entanglements of privatized science, governance and politics addressed as experimentality or government-by-exception".[34] As noted by Petryna, the most striking feature of these experimental humanitarian interventions is their urgency, as they are framed in "terms of absolute emergency and unique exceptionality".[35]

Moreover, the emergency context changes the patterns of interaction between those being experimented on and the humanitarian actors. Central here is the lack of empowerment. Critical discussions on the problem of informed consent have a long trajectory in medical trials, in discussions about data collection and in relation to humanitarian aid more generally. Critics have noted that the scale of human suffering can produce ethically questionable forms of consent – in both

31 Kristin Bergtora Sandvik and Nathaniel A. Raymond, "Beyond the Protective Effect: Towards a Theory of Harm for Information Communication Technologies in Mass Atrocity Response", *Genocide Studies and Prevention: An International Journal*, Vol. 11, No. 1, 2017, p. 16.
32 Craig Calhoun, *The Idea of Emergency: Humanitarian Action and Global (Dis)Order*, Zone Books, New York, 2010.
33 M. Lock and V.-K. Nguyen, above note 15.
34 R. Rottenburg, above note 22.
35 *Ibid.*, pp. 423–440.

analogue and digital interventions. Put differently, humanitarian crises and emergency contexts may create a space that appears to be "ethics-free" precisely because they are disastrous and beyond the reach of regulation, and consequently, there is a risk that these contexts may be regarded as offering "access to a pool of highly endangered people".[36] In short, with the sudden suspension of normalcy, whole groups of people are at risk of being considered suitable subjects of experimentation. Thus, vulnerabilities and risks arise not only from "objective" conditions of crisis, but also from the type of permissibility, urgency and suspension of normalcy that comes with the declaration of an emergency.

Experimental innovation: New orthodoxies and new trade-offs

The increasing variety of actors operating in humanitarian contexts, notably under the auspices of humanitarian innovation (vis-à-vis their experimental tendency) and humanitarian technology, brings with it a host of attendant consequences. On a general level, technology creates new settlements with respect to how humanitarian work can legitimately be organized, the effect of technology on the distribution of resources, the way in which technology is redefining relationships, and the way in which data collection creates new vulnerabilities.[37]

The notion that "communications are an important form of aid, and can be of equal importance to survivors as food, water and shelter",[38] is a mainstay of the humanitarian technology discourse – and increasingly also of the general humanitarian discourse. According to the 2013 *World Disasters Report*, "self-organization in a digital world affords opportunities unfeasible in the analogue past. Disaster-affected populations now have greater access to information, and many of their information needs during a crisis can be met by mobile technologies."[39] In essence, these kinds of statements represent a move to see value-added information as relief in itself.[40]

Furthermore, the wholesale invitation of private-sector actors, whether through grants or public–private partnerships, may result in practical and legal issues such as the "fail fast" approach to innovation and the potential for exploitation of subjects of a differential legal status in the context of humanitarian emergency. Across the humanitarian sector, relying on public–private partnerships is the "new" orthodoxy, combining humanitarian values with private-sector efficiency and responsiveness to market conditions. The rationale for including the private sector in humanitarian action is that partners can contribute to humanitarian solutions with different expertise and resources. At first glance, the

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36 A. Petryna, above note 25.

37 K. B. Sandvik and K. Lohne, above note 10, pp. 219–242.

38 GSMA, "Key Takeaways from the UN Working Group on Emergency Telecommunications", 17 April 2014, available at: www.gsma.com/mobilefordevelopment/programme/disaster-response/key-takeaways-from-the-un-working-group-on-emergency-telecommunications, cited in K. B. Sandvik and K. Lohne, above note 10.

39 International Federation of Red Cross and Red Crescent Societies, *World Disasters Report 2013*, Geneva, 2013, cited in K. B. Sandvik and K. Lohne, above note 10.

40 K. B. Sandvik and K. Lohne, above note 10.

humanitarian sector and the private sector appear to share a set of assumptions about the competence, presence and relevance of the private sector in improving humanitarian aid. The agreement of humanitarians and private-sector actors on mutual values includes consideration of the comparative advantages of each actor. Private-sector actors are able to provide resources and outsourced quality assurances, while benefiting from the license and operational projection capacity of humanitarian actors. Humanitarians are able to provide exceptional legal status, data access and moral imperatives; in return, they receive much-needed subsidies and accept marketing narratives.[41] Nevertheless, to unpack how technology engenders new partnership settlements, it is necessary to acknowledge the heterogeneous character of these partnerships within the humanitarian sector. For private-sector partners, humanitarian contexts can serve a number of commercial purposes, including public relations, testing new products or services on populations without typical recourse, and exploiting institutional disarray to enter new markets.[42]

Within the process of testing new inventions, neither the safety of the humanitarian populations involved in these experiments nor the success of the trial itself is necessarily a main objective. Even if experiments fail, they might still produce other (commercial) benefits; valuable data and knowledge will also emerge from experimental practices that unfold in other ways than expected and with other consequences for the implicated test subjects.[43] In particular, public–private partnerships can be used to dilute professional regulations or oversight. Specifically, it is worth pointing out the implications of the different legal statuses – i.e., the private sector can use the United Nations' (UN) legal immunity to test new ideas, and the UN can use the private sector to externalize research and development without direct accountability.[44]

On a related note, the current tendency for experimental innovation calls on us to consider how ethical principles in this landscape are changing, as illustrated, for example, by the idea of "failing faster" in order to "succeed sooner".[45] As observed by Betts and Bloom, private technology businesses are encouraged to "fail fast", divesting from the success of specific approaches under

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41 The idea is that humanitarian actors have more latitude to operate – often without common requirements like local registration – than corporate actors would. They are also often (either practically or actually) indemnified – i.e. the UN, is protected from litigation based on its interventions. Public–private partnerships extend the legal status of government action and parity to the work of private sector corporations.

42 K. B. Sandvik and K. Lohne, above note 10.

43 R. Rottenburg, above note 22, in P. Redfield, above note 12.

44 Broadly speaking, in public–private partnerships, companies provide data, algorithms and talent, while international NGOs and governments provide operational authority, money, and political cover. For an illustration with regard to UNICEF's partnership with IBM in the Zika response, see UNICEF, "IBM Shares Data to Further Strengthen Efforts to Fight ZIKA", 31 July 2016, available at: unicefstories.org/2016/07/31/ibm-shares-data-to-further-strengthen-efforts-to-fight-zika/.

45 On the idea of "fail faster, succeed sooner" as a core axiom in the field of innovation, see Peter Manzo, "Fail Faster, Succeed Sooner", *Stanford Social Innovation Review*, 23 September 2008, available at: ssir.org/articles/entry/fail_faster_succeed_sooner; Patrick Love, "Fail Faster, Learn Fast and Innovate", *OECD Insights*, 10 April 2014, available at: oecdinsights.org/2014/04/10/fail-fast-learn-fast-and-innovate/.

the assumption that failure will reveal successful approaches in the long run.[46] The mantra of "fail fast, fail often and fail early"[47] can be found in the literature on humanitarian innovation, often presented without attention to trade-offs or costs,[48] or in a manner that encourages humanitarian actors to simply embrace the risks that such a commitment to "experimental innovation" entails.[49]

The inevitability and potentially instructive nature of failure are often offered as an argument against diligence and caution. The "fail fast" approach to humanitarian innovation, as with technology companies, benefits from the narrative of urgency and the distance between those responsible for failure and those who bear its costs. Here, the emphasis is on the emergent distinction between "good" and "bad" failure hinging on the degree of preceding diligence informing an intervention – predictable failure is normatively bad. Whilst learning from experimentation is important, it does not obviate critical analysis or appropriate weighting of potential harms, especially when undertaken by humanitarian actors. Both the explicit acceptance of failure and the emphasis on urgency need to be closely interrogated. As noted by one commentator, "the 'lean start-up' model of experimentation and fail fast may not be appropriate under conditions where the ethics of playing with people's lives may be at the heart".[50]

Topical examples

Conceptualizing harm as risk of failure and success

Analysis of humanitarian innovation is often based on the assumption of the functionality of the underlying intervention, which misses the larger source of harm: the distortion of the underlying system that deploys it. In what follows, three examples of humanitarian experimentation, often cited as innovations, are presented. While biometrics have reached an "established" experimental *modus* (i.e., they are firmly integrated into humanitarian activity while significant experimental attributes continue to shape how they work), the experience with

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46   Alexander Betts and Louise Bloom, *Humanitarian Innovation: The State of the Art*, OCHA, New York, 2014, citing Ryan Babineaux and John Krumboltz, *Fail Fast, Fail Often: How Losing Can Help You Win*, Penguin, New York, 2014.

47   See, for example, Hendrik Tiesinga and Remko Berkhout (eds), *Labcraft: How Innovation Labs Cultivate Change through Experimentation and Collaboration*, Labcraft Publishing, London, cited in Louise Bloom and Romy Faulkner, "Innovation Spaces: Transforming Humanitarian Practice in the United Nations", Working Paper Series No. 107, Refugee Studies Centre, 13 March 2015.

48   Steve Blank, "Why the Lean Start-Up Changes Everything", *Harvard Business Review*, Vol. 91, No. 5, 2013; Eric Ries, *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*, Crown Business, New York, 2011.

49   "The exploratory and uncertain nature of innovation means that some degree of 'failure' is inherent, as results will often differ from expectations. … [O]rganisations and donors will need to become less risk averse and embrace 'failing fast' in order to support adaptation and improvement." Alice Obrecht, "Separating the 'Good' Failure from the 'Bad': Three Success Criteria for Innovation", *Humanitarian Exchange*, No. 66, 2016, available at: odihpn.org/wp-content/uploads/2016/04/HE-66-Web-Final.pdf.

50   John Bessant, "Learning from the Humanitarian Innovation Laboratory", *InnovationManagement.se*, 23 August 2016, available at: www.innovationmanagement.se/2016/08/23/humanitarian-innovation-laboratory/.

Ebola health data is a recent, one-time experience; and cargo drones, while portrayed as effectively changing humanitarian aid delivery, are in fact only in a testing phase. In each case it is demonstrated how these endeavours, even where technologically functional, affect the implicated humanitarian population as well as the humanitarian organizations involved. The forms of harm that materialize come not just from the design of the innovation, but also from the way in which the innovation affects how humanitarian organizations allocate their limited resources, particularly when analyzed according to humanitarian principles and the "do no harm" imperative. More specifically, cases are examined by drawing distinctions between risks resulting from failure and risks resulting from successful experimentation, as an analytical prism.[51] This distinction between risks stemming from technology failure and risks stemming from successful uses departs from the literature, in which technology failure has been the focus. Specifically, it stresses the need to appreciate how the effect of technology success constitutes an important dimension of the range of potential risks that may emerge in the context of humanitarian experimentation.

Humanitarian experimentation in global governance: UNHCR and biometrics

In emergency contexts of different kinds, humanitarianism refers to the delivery of assistance and protection to vulnerable populations. However, a different implication of humanitarianism becomes visible when we pay attention to the risks of failure and to the risks that may stem from success, in the context of the Office of the UN High Commissioner for Refugees' (UNHCR) use of innovative biometric registration technologies (mainly fingerprint and iris scanning) in various refugee settings, notably in Africa and the Middle East. UNHCR's first "trialling" of biometric refugee registration was in 2002, when the technology was introduced as a mandatory part of a repatriation programme along the Afghan–Pakistani border.[52] Since these initial endeavours, UNHCR has deployed biometrics in more than 125 sites across the world.[53] Although these endeavours have only received very limited critical attention, various failures have occurred, including failures that have a potential to translate into humanitarian failures with undesirable consequences for the implicated refugee populations.

For example, a technical challenge was encountered in Kenya where "intermittent network failure" caused problems for the implementation of a biometrics system. The project was intended to improve the delivery of humanitarian assistance, but instead this technical failure led to "delays,

51 For more on this analytical framework, see K. L. Jacobsen, "Experimentation in Humanitarian Locations" and *The Politics of Humanitarian Technology*, above note 2.
52 Peter Kessler, "Afghan 'Recyclers' under Scrutiny of New Technology", *UNHCR News*, 3 October 2002, available at: www.unhcr.org/cgi-bin/texis/vtx/search?page=search&skip=252&docid=3d9c57708&query=waiting%20to%20go%20home.
53 UNHCR, "UNHCR's Responses to Bidders' Requests for Clarification", February 2013, available at: www.unhcr.org/512732395.pdf.

disruption or cancellation of the food distribution in the camps".[54] Similar "logistical and technical challenges" were encountered in Malawi, where UNHCR has recently been trialling the latest version of its biometric registration system.[55] Moreover, UNHCR has been made aware of other issues, including cases where biometric failures have caused "inactivation" of refugees in the system or cases where problems have arisen due to technical failures causing "pending" status and consequently delay, which in turn has complicated refugees' access to assistance – an example of this has been documented in relation to UNHCR's use of biometrics in Kenya.[56] Additionally, it has been pointed out that technical failures, such as the risk of false matches, can translate into humanitarian failures to assist genuine refugees.[57]

UNHCR has not only experienced failures in its roll-out of biometric refugee registration; the use of iris registration has also had a number of effects that deserve attention. Firstly, UNHCR's use of iris registration resulted in the creation of "humanitarian success stories" that, in turn, buttressed further roll-out of biometric registration technologies, not only in humanitarian refugee management but also beyond. Secondly, these humanitarian technology uses – the successful capture and storage of a refugee's iris image in the form of a digitalized biometric template – contributed in important ways to making it possible to include additional dimensions of refugee existence into broader efforts aimed at managing refugee flows. To understand how these technology uses may affect refugee safety, it is imperative to appreciate the broader political context within which humanitarian uses of biometrics unfold. Indeed, striving to improve the management of refugee flows is not solely a humanitarian undertaking but also a high priority for States, whose security practices are increasingly based on a logic which associates terrorism with migration.[58] Yet, in some cases of humanitarian refugee biometrics, cross-matching of data in humanitarian and national databases was an integral part of the system design. In the Dadaab camps in Kenya, biometric refugee registration was designed in such a way that the biometric data of refugees was cross-matched against the biometric data of Kenyan nationals (who had been registered biometrically during Kenyan elections).[59] In other words, this experimental use of biometrics produced digital refugees at risk of exposure to new forms of intrusion and insecurity – risks that

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54 World Food Programme (WFP)/UNHCR, *Joint Assessment Mission – Kenya Refugee Operation, Dadaab (23–25 June 2014) and Kakuma (30 June–1 July 2014) Refugee Camps*, 2014, available at: www.unhcr.org/54d3762d3.pdf.

55 UNHCR, "UNHCR Pilots New Biometrics System in Malawi Refugee Camp", *UNHCR News*, 22 January 2014, available at: www.unhcr.org/52dfa8f79.html.

56 WFP/UNHCR, *Joint Assessment Mission – Kenya Refugee Operation: Dadaab and Kakuma Refugee Camps*, 23–27 June 2014 and 30 June–1 July 2014, pp. 51–52.

57 Gus Hosein and Carly Nyst, "Aiding Surveillance: An Exploration of How Development and Humanitarian Aid Initiatives are Enabling Surveillance in Developing Countries", Privacy International, London, September 2013, available at: papers.ssrn.com/sol3/papers.cfm?abstract_id=2326229.

58 Georgios Karyotis, "European Migration Policy in the Aftermath of September 11: The Security–Migration Nexus" *Innovation*, Vol. 20, No. 1, 2007.

59 Safran, "Kenya: Delivering Credible Elections Using Biometric Data", available at: www.morpho.com/en/media/20150504_kenya-delivering-credible-elections-using-biometric-data.

become visible once we acknowledge how successful technology trials can also have critical implications.[60] Insofar as "safer" and more acceptable biometric technologies were produced, and to the extent that they were circulating back to metropolitan centres, a critical implication of this case of humanitarian experimentation was that these practices did not simply help protect refugees; they effectively rendered the safety of this refugee population subordinate to the production of ostensibly safe technologies, so much so that the implicated refugees in a certain sense were delivering "safety" (in the form of tested technologies) to citizens outside of these experimental humanitarian zones – not the other way around.[61]

Disaster experimentation: Big data and Ebola

The 2014 outbreak of Ebola in West Africa was not only one of the most dramatic humanitarian crises in recent memory; it was also one of the clearest examples of disaster experimentation. There are strong indications that the humanitarian community asked for access to data that was illegal for it to have, under false pretences, without a strong rationale or proof of value. This wasted significant resources, complicated coordination, and broke a wide range of laws.

There have been more than twenty outbreaks of Ebola in sub-Saharan Africa, but this one became a pandemic threat because it overwhelmed the tenuous trust relationship between the Liberian government and its people, and then spread.[62] The failed legitimacy of Liberian health institutions was the catalyst for the regionalization of the outbreak – the Liberian people, without trustworthy guidance, ignored and overran the clinics trying to contain the disease. Public- and private-sector organizations confused the lack of legitimacy as a data problem. This led academics, journalists, governments and humanitarians to push for access to mobile network operators' databases, called call detail records (CDRs), to aid the response effort.[63] CDRs are the data equivalent of fissile material, meaning they are some of the most re-identifiable, dangerous and regulated data sets in the world.[64] Humanitarians justified access by citing the need to expedite the established, analogue process of contact tracing Ebola. At the time, however, there were no tested approaches to digital contact tracing, let alone approaches specific to the Ebola virus.[65] Consequently, in the middle of a disastrous global public health emergency,

60 K. L. Jacobsen, "Experimentation in Humanitarian Locations", above note 2.
61 K. L. Jacobsen, "Making Design Safe for Citizens", above note 2.
62 This section builds on S. M. McDonald, above note 2; Jonathan Corum, "A History of Ebola in 24 Outbreaks", *New York Times*, 29 December 2014, available at: www.nytimes.com/interactive/2014/12/30/science/history-of-ebola-in-24-outbreaks.html.
63 "Ebola and Big Data: Waiting on Hold", *The Economist*, 27 October 20147, available at: www.economist.com/news/science-and-technology/21627557-mobile-phone-records-would-help-combat-ebola-epidemic-getting-look
64 Alket Cecaj, Marco Mamei and Franco Zambonelli, "Re-Identification and Information Fusion between Anonymized CDR and Social Network Data", *Journal of Ambient Intelligence and Humanized Computing*, Vol. 7, No. 1, 2016.
65 See S. M. McDonald, above note 2 – specifically, interviews with Dr Joel Selanikio, a technologist and Ebola responder, and Linus Bengtsson, the CEO of Flowminder and the person most cited in calls for CDR access.

humanitarian organizations and their subcontractors lobbied for access to some of the world's most sensitive data to build and use an untested approach to combating one of its deadliest diseases. In some places, they got it.

The response to the Ebola outbreak was one of the most digital in humanitarian history. During and in the aftermath of the outbreak, it was also presented as a digital humanitarian success story. However, the systems and standards used were significantly less proven than other important interventions, such as vaccines. There is a stark contrast between the experimentation processes used to validate the effectiveness of vaccines and predictive data models prior to deployment in a humanitarian crisis.[66] The two primary proposed uses of CDRs were (1) to coordinate response efforts, and (2) to contact trace the spread of the disease.

The Ebola response's coordination problems, however, were as much a product of politics and the role of institutions as they were about technology or data. There was no primary operational point of control, such as ministries of health, meaning that both data and resources were often uncoordinated. This was exacerbated by a host of academics, private philanthropists and technology companies that deployed interventions with much fanfare, but without humanitarian experience or partners. The digitization of the response and the use of CDRs did not result in better coordination, but drew limited attention and resources towards fixing digital problems, at the expense of responding.[67]

The calls for CDRs to contact trace Ebola were deeply flawed and did not enable responders to digitally track or predict the spread of the disease. Ebola is a haemorrhagic fever, meaning that it only passes through contact with the fluids of an infected person. While CDRs can track approximate location, they are not specific enough to demonstrate contact, meaning they cannot show transmission. That did not prevent academics, journalists and humanitarian organizations from campaigning aggressively for access to CDRs.[68] Many of these organizations also stood to gain commercially from access to CDRs, whether through competitive advantage over other humanitarian organizations or through the testing of commercial products. Even if commercial benefit was not the primary motivation, the humanitarian community's request for CDRs functionally commoditized the state of exception created by the emergency – and, given their lack of applicability to contact tracing, raises questions about the motivations behind, and the standard of care exercised before, granting those requests.

Despite this, the humanitarian innovation community continues to debate the harms of experimentation with CDRs, focusing on privacy and security. Though these are important, rights-based concerns, they are a red herring for more serious harms. The most serious harm is the diversion of scarce resources to ineffective interventions. In the

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66 Carl H. Coleman, "Control Groups on Trial: The Ethics of Testing Experimental Ebola Treatments", *Journal of Biosecurity, Biosafety and Biodefense Law*, Vol. 7, No. 1, 2016.

67 Larissa Fast and Adele Waugaman, *Fighting Ebola with Information: Digitized Data and Information Flows in the West Africa Ebola Outbreak Response*, United States Agency for International Development, available at: www.globalinnovationexchange.org/fighting-ebola-information.

68 S. M. McDonald, above note 2.

Ebola response, key organizations used different data sets – and the resulting disparate and conflicting narratives caused significant challenges. In addition, CDRs are tightly regulated data sets, and there are telecom regulations, data protection laws and tort laws that prevent their sharing. The humanitarian community likely accessed CDRs illegally, subjecting its organizations to a range of legal liabilities. CDRs are dangerous assets in the best-intentioned hands, and as a result they are targeted by companies and intelligence operations that exploit humanitarian organizations for military operations.[69] Humanitarian organizations are also subject to the humanitarian principles: humanity, neutrality, impartiality, and independence, as well as do no harm. Yet, there is a growing body of proof that public service's use of algorithms causes significant harms, and should result in accountability.[70] In order to realize both the benefits and the principled obligations of digital humanitarianism, the organizations that undertake disaster interventions will need to invest in institutional experimentation and local dispute resolution infrastructure.

Aid experimentation and commercial opportunity: Cargo drones in unregulated airspace

The third topical example focuses specifically on the testing of immature technology in the humanitarian space, in order to unlock regulatory permissions and market access in the global North. In addition to the controversies surrounding drone wars, drones are generally perceived as technologies that are subject to a range of risks, from pilot error to mechanical failure, cyber-attacks and bad weather. The result is very limited access to civil airspace. Thus, the drone industry has a significant unmet need to test and improve the technology by increasing flight hours and trial applications. The African continent's lack of infrastructure, including power lines, airspace control and commercial flights, is attractive to the drone industry. African airspace has been described as "less cluttered with flights that have slowed the adoption of commercial drones in North America and Europe".[71] Africa is also a place where drones can obtain legitimacy as a "good" technology that is cheap, effective, precise and safe.[72] Hence, as noted by the founder of drone delivery company Zipline, "it's basically inevitable that showing that this can be done safely and reliably, and that it can save thousands of lives, will rapidly increase the adoption of this kind of technology in the US".[73]

69   Glen Greenwald, "How the U.S. Spies on Medical Nonprofits and Health Defenses Worldwide", *The Intercept*, 10 August 2016, available at: https://theintercept.com/2016/08/10/how-the-u-s-spies-on-medical-nonprofits-and-health-defenses-worldwide/.
70   Julia Angwin, "Make Algorithms Accountable", *New York Times*, 1 August 2016, available at: www.nytimes.com/2016/08/01/opinion/make-algorithms-accountable.html.
71   David Lagesse, "If Drones Make You Nervous, Think of Them as Flying Donkeys", *National Public Radio*, 31 March 2015, available at: www.npr.org/sections/goatsandsoda/2015/03/31/395316686/if-drones-make-you-nervous-think-of-them-as-flying-donkeys, cited in K. B. Sandvik, above note 30.
72   K. B. Sandvik, above note 30.
73   Amar Toor, "This Startup is Using Drones to Deliver Medicine in Rwanda: Zipline Will Begin Delivering Blood and Drugs across the Country in July", *The* Verge, 5 April 2016, available at: www.theverge.com/2016/4/5/11367274/zipline-drone-delivery-rwanda-medicine-blood.

The debates about drones in humanitarian work have so far revolved around monitoring, data collection and the volunteer tech communities. In a relatively new development, humanitarian logistics/supply chain management communities, the aviation industry and drone start-ups have been discussing and testing how cargo drones can help bridge the last mile to bring blood supplies and HIV diagnostic kits to suffering African populations in countries like Lesotho, Malawi and Rwanda. According to their promoters, the numbers of deaths cargo drones could help to prevent are staggering, making the cost of inaction morally unacceptable. For instance, according to the UN International Children's Emergency Fund, about 10,000 children died from HIV-related diseases in Malawi in 2014,[74] and less than half of them were receiving medical treatment. Drones could be a "breakthrough" in overcoming transport problems.[75]

Of particular concern is the fact that the threshold for flying over densely populated areas appears to be low. Matternet, a drone delivery start-up, has tested a project in Maseru, Lesotho. Matternet's drones delivered blood samples from clinics to hospitals, where they could be analyzed for HIV/AIDS. The planning phases of this testing were very short. When testing their drones in Lilongwe, Malawi, the company worked for a week to acclimate the drones to the new geography and make sure they could fly safely over densely populated areas, swiftly followed by the first official test launch the following week. In a different field test in Papua New Guinea, in order to enhance its ability to overcome the geographical and logistical challenges hampering its ability to deal with multi-drug-resistant tuberculosis, Médecins Sans Frontières ran a trial with Matternet in 2014. The test faced significant technological constraints – while the use of drones was effective with respect to time saved in contrast to ground transport and promising in terms of local community support, two out of six prototypes were lost, and there were significant challenges with respect to the human action required for battery swapping and the relatively short maximum range (28 kilometres) of the drone.[76]

This use of cargo drones has received significant and generally uncritical media attention – as if drones were already solving humanitarian problems. However, most cargo drone models under development are still prototypes, and pilot projects are currently limited to lightweight, high-value goods.[77] Here, it is noted that the evolving use of smaller cargo drones – based on pilots and test cases – exemplifies a disconnect between the process of invention and the application of the invention, in which the potential harms of a technology are

74 Aditya Bhat, "How these Drones in Malawi Will Save Lives of Children with HIV", *International Business Times*, 28 December 2016, available at: www.ibtimes.co.in/how-these-drones-malawi-will-save-lives-children-hiv-710178.

75 Geoffrey York, "Drones Enter Africa's Fight against HIV", *Globe and Mail*, 14 March 2016, available at: www.theglobeandmail.com/news/world/malawi-looks-to-use-drones-to-slash-wait-times-for-hiv-diagnosis/article29214675/.

76 Swiss Foundation for Mine Action (FSD), *Case Study No. 2: Delivery – Using Drones for Medical Payload Delivery in Papua New Guinea*, Geneva, 2016. Also see: www.youtube.com/watch?v=XpsGay6n8cM.

77 FSD, *Drones in Humanitarian Action*, Geneva, 2016, available at: http://drones.fsd.ch/en/drones-in-humanitarian-action/.

assessed in the abstract instead of in context. This disconnect is made possible and justified by reference to the "inherent" attributes of Africa: human suffering, lack of infrastructure and the imperative to find solutions. Having the application of an immature product like cargo drones so directly implicated in the invention process raises a number of questions about safety, security and responsibility. Many of the same dilemmas that surround the use of humanitarian drones for data collection are present with respect to cargo drones (which most often also have a camera). This includes the surveillance aspect, questions about the legality and purpose of data collection and its ownership, and challenges regarding the secure storage and appropriate sharing of data. At the same time, the cargo drone engenders an additional harm matrix: human biological material counts as personal data. Thus, losing biological material both destroys the possibility for treatment and compromises personal data. With respect to this, direct harm can ensue from a drone falling from the sky due to technological or human failure, caused by the drone itself or its cargo. Distributive harm can also ensue, when aid is not getting delivered (i.e., is lost or destroyed) or delivered late.

At this relatively early stage, however, there are also risks emerging from the "success" of cargo drone promotion, in the sense that the *modus operandi* of the experimental phase compromises some of the more fundamental tenets of responsibility, accountability and credibility of the humanitarian enterprise. The assertion that "Africa needs drones more than roads"[78] (because drones are cheaper, more environmentally friendly, or crash less than cars), a line of argumentation repeatedly offered by actors developing and selling cargo drones, is problematic.[79] By foregrounding the moral choice between saving lives and doing nothing, the trade-off between safety and risk acceptance becomes hidden. Similarly, comparing the cost of drones to the cost of building road networks risks obscuring resource prioritization processes.

A taxonomy of potential harms

Underlying trends and the risk of harm

As noted in examples above, experimental innovation in the testing and application of new technologies and practices in humanitarian contexts can underpin unethical, illegal and ineffective trends that result in increased vulnerability and harm for the implicated humanitarian subjects, and potentially also for the implicated humanitarian actors. These consequences can be direct or indirect. Risk can result from both the failure and the success of such experiments. The examples described above illustrate a host of experimental harms, from the privacy violation of collecting personally identifiable information, to commercial gains

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78 Rachel Feltman, "Making the Case that Africa Needs Drones more than Roads", *Quartz*, 16 March 2014, available at: qz.com/188112/making-the-case-that-africa-needs-drones-more-thanroads/.
79 See K. B. Sandvik, above note 30.

obtained from suspending restrictions on testing technology products on people, to the distribution of resources in ways that serve technologies or private-sector actors over the needs of populations in these unregulated contexts.

Biometric procedures can be set up in a way that violates international refugee and human rights law. The collection of personal identifiable information without consent is almost always illegal, and doing so often requires the extraordinary exertion of government powers. Cargo drones can be operationally ineffective, represent a wasteful use of available resources and potentially introduce a host of new, unplanned-for challenges with respect to personal data. The abuse of data rights causes direct harm not only for the people humanitarians serve, but also for humanitarian organizations, including loss of legitimacy and reputational damage, failure of operations, or litigation. It is, of course, also a loss for humanitarian organizations when, in the worst-case scenario, these practices of experimental innovation result in harm to beneficiaries. The examples above, however, are singular harms, which are exacerbated by their relationship to larger, underlying trends in humanitarian aid.

The adoption of humanitarian innovation and experimentation processes necessitates an articulation of the harms that emanate from their misuse. The harms created by humanitarian experimentation, however, are deeply contextual, and difficult to predict. The concrete examples and trends that have been explored above are intended as illustrative as opposed to comprehensive, and highlight the potential consequences of experimental practices in humanitarian contexts. Acknowledging that all interventions into contexts defined as emergencies involve some degree of uncertainty, a taxonomy intended to help humanitarian organizations recognize and frame their practices of innovation in ethically responsible ways is outlined here. Borrowing from the security community's best practices, this taxonomy is an effort to outline a threat modelling exercise. As a result, two tiers of harm taxonomy are presented: the risk of harm to humanitarian subjects and the risk of harm to humanitarian organizations. At a practical level, we emphasize a taxonomy of harm that weighs the organizational use of experimental innovation in humanitarian contexts against the potential to result in the following harms: (1) distribution of harm, (2) resource scarcity, and (3) legal liability and reputational damage.

Distribution of harm: Ethical variability in humanitarian space

When humanitarian organizations build systems to distribute relief, they implicitly influence the distribution of harm. According to humanitarian principles, this distribution is necessarily driven by need. However, digitization highlights more clearly than ever before how politicization and relationships of power shape mechanisms for need assessment and evaluation. Power relationships are crucial in the humanitarian domain broadly speaking – and are so too in relation to practices of experimental humanitarian innovation. Such practices may, for example, reinforce a specific distribution of security/insecurity by implicitly enacting assumptions about humanitarian subjects as "fit" for more experimental

practices of innovation than would be found acceptable outside of these humanitarian contexts. Humanitarian innovations unevenly distribute harm, not only by favouring those that are prioritized by a technology's assumptions, but also by exposing recipients of humanitarian assistance to the new harms posed by the underlying innovation itself.

Here it is useful to refer to the notion of "ethical variability", a concept known from discussions on the globalization of medical trials. According to Petryna, ethical variability is one of several modes assisting pharmaceutical sponsors in mobilizing much larger populations of human subjects, and in doing so much more quickly. Ethical variability refers to how international ethical guidelines (informed by principles and guidelines for research involving human subjects) are being recast – with standards lowered and the interest matrix shifted – as trials for global research subjects are organized.[80] So too is it paramount to acknowledge how ethical guidelines are being recast in the context of digital innovation in the name of making humanitarianism fit for purpose in an era of digital technology.[81] Even in the absence of ill intentions or negligence, the collection and use of sensitive data creates practical dynamics that inherently question, if not violate, humanitarian principles and the imperative to do no harm.[82]

Thus, humanitarian actors need to understand the linkage between datafication and harm distribution. The risks are not simply the failure of the technology, but the way that such failure limits or harms access to vital resources, such as humanitarian assistance. Another new type of insecurity emerges in the context of this experimental datafication endeavour: the risk that the digitized data may be used in ways that do not necessarily buttress the safety of recipients of aid and protection. How are beneficiaries informed about how personal data is handled, and with whom and for what purposes it will be shared? Whereas the humanitarian technology and innovation agenda sees data as inherently empowering, this notion stands in contrast to the outcome-oriented analysis of the World Bank's 2016 *Digital Dividends* report, which points to stark inequalities emerging as a direct effect of information technology and its use in humanitarian and development systems.[83] At the outset, it seems important to investigate whether information is necessary, versus sufficient, to achieve the desired impact of a humanitarian intervention in which it is treated as an end. In addition, it is clear that information distribution itself is uneven, and as the World Bank reports, it often becomes a source of inequality – in violation of core humanitarian principles. This inequality is not limited to beneficiaries; access to data shapes political, financial, and organizational dynamics as well, which is increasingly important as key elements of response efforts privatize.

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80   A. Petryna, above note 25.
81   See Matthew Hunt *et al.*, "Ethics of Emergent Information and Communication Technology Applications in Humanitarian Medical Assistance", *International Health*, Vol. 8, No. 4, 2016.
82   K. B. Sandvik *et al.*, above note 2.
83   World Bank, *World Development Report 2016: Digital Dividends*, 2016, available at: www.worldbank.org/en/publication/wdr2016.

Resources distribution and scarcity considerations

Additionally, increased attention must be paid to a more fundamental shift that is afoot. As it was argued in the three case examples above, contemporary humanitarian experimentation is increasingly extractive. Consequently, there is a need to draw attention to the range of consequences resulting from how the humanitarian sector now sees data as both a means and an end of relief, in programming and policy terms. The humanitarian community's willingness to include commercial application and acquired data as impact metrics is a derogation of its traditional priorities, and a distraction from critical analysis of positive beneficiary impact. Attention must be paid not only to how humanitarian technology shapes perceptions of what counts as resources, but also to the method of distribution of those resources, in terms of factors that determine access, distribution rights, prioritization of resources and the transparency of the underlying reasoning.[84]

Resources are notoriously scarce during a humanitarian crisis, meaning that specific practices of humanitarian assistance should be evaluated not only against their individual likelihood of success, but also against their potential impact relative to other forms of humanitarian assistance. The resource analysis for humanitarian organizations engaging in innovation should define their desired impact, along with clear indicators, and show proof of an intervention's prior impact, whether from experimentation or deployment, as a weighting factor to evaluate their resource allocation. As described above, the potential for harm increases significantly when experimental methodologies influence the execution of humanitarian assistance – both in terms of efficiency and distribution.

Circling back to the historically situated account of humanitarian experimentation, it is here suggested that the current tendency for humanitarian innovation to be experimental represents an evolution, not only of what is being "tested" but also of who is doing the testing, the motivations for that testing, and the funding involved. In a growing number of crisis situations, resource scarcity is driving humanitarian organizations to partner with private-sector actors – a practice that combines the extraordinary operational license afforded to humanitarian organizations and the exceptional freedom given to the private sector to commercially trial unregulated technologies. In effect, however, these partnerships give the least tested interventions the greatest license to operate in contexts where the population has the least recourse. These partnerships bear significantly more legal, operational and principled scrutiny than they currently receive.

Hence, this paper draws attention not only to the operational role of humanitarian experimentation, but also to the underlying shifts in the character of humanitarianism: from physical to digital interventions, from public and non-profit actors to hybridized commercial implementations, and from government to private funding. More specifically, the emphasis must be on the range of consequences resulting from how the humanitarian sector now sees data as both

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84   K. B. Sandvik *et al.*, above note 2.

a means and an end of relief in programming and policy terms. This includes giving attention to the ever-changing assemblage of actors (an expanding humanitarian field, including increasing public–private partnerships and a growing humanitarian innovation field) as well as changing funding sources and financing models (a growing acceptance of profit motive, and a move away from public money through global philanthropy, venture capital and crowd-funding). Attention to such changes is important since they contribute in significant ways to shaping where and how humanitarian experimentation is taking place, and who is doing it.

Legal liability and reputational damage

Although emergencies are exceptional circumstances, they are not free from the rule of law – including the laws that regulate and protect the subjects of human experimentation. Humanitarian organizations, while operating with good intentions, often subject themselves to liability through innovation by overestimating how proven interventions are, underestimating the harms they may cause, and failing to engage in the bodies that regulate human experimentation. Currently, such regulatory needs are not a routine element of the laws that govern the specifics of an effort. Humanitarian organizations are increasingly held legally accountable for the intentional and unintentional consequences of their work. For many humanitarian organizations, legal liability, particularly in emerging areas of practice, can be difficult to decipher. Nevertheless, impact analysis is now a basic precondition for large-scale implementation of nearly every type of intervention. It is incumbent on humanitarian organizations to conduct a legal impact analysis, for both success and failure, of experimental and innovative interventions.

Finally, for their license to operate, humanitarian organizations uniquely rely on popular perceptions of their intentions, necessity and effectiveness. Where humanitarian experimentation results in the deployment of invalidated methodologies that undermine those perceptions, it risks both the individual integrity of the organization and future acceptance of the collective efforts of the international community. Humanitarian innovation initiatives require a clear articulation of the evidence base that underlies an intervention and a consideration of its potential effect on perceptions of the response effort.

Measuring against humanitarian imperatives and principles

Humanitarian organizations rely on their conformity with internationally approved principles for their license to operate in politically complex environments. It is argued here that humanitarian principles are a useful framework for understanding the practical considerations listed above, and that each weighted factor should include derogation of the core humanitarian principles as a potential source of harm. The focus here is on the core humanitarian imperatives and principles: (1) do no harm, (2) humanity, (3) neutrality, (4) impartiality and (5) independence.

- The principle of do no harm compels humanitarian organizations to define and evaluate the potential of an intervention to cause harm, and proof of impact is a necessary component of that analysis. It is difficult to prove that an untested, experimental intervention will not cause absolute or relative harm, but the onus of proof is on the implementing humanitarian organization, and should be a required component of any publicly funded intervention.
- The principle of humanity aligns particularly with the practical consideration of resource scarcity, in that it requires the prioritization of alleviating human suffering and preserving dignity. Humanitarian experimentation, in order to appeal to the principle of humanity, implies a need for both assessment of relative impact on human suffering and, uniquely, a need for mechanisms that give the affected a meaningful ability to hold implementers to account.
- The principles of neutrality and impartiality, though distinct, combine to highlight the importance of transparency in core components of humanitarian experimentation, including the priorities of needs assessment, the selection criteria for interventions, and the predictable outcomes or impact of using an intervention. For example, if a humanitarian organization is considering employing biometrics to coordinate relief distribution in ways that disproportionately benefit, explicitly or implicitly, a specific group, it is likely in violation of both principles.
- The principle of independence, in addition to the impact analysis, also invokes an analysis of motivation that includes economic, political and military benefit – an analysis that digitization and privatization make substantially more complicated. The increasing role of private-sector actors – particularly in supporting the deployment of experimental approaches to humanitarian crises – increases the necessity of performing beneficial ownership analyses of proposed interventions, in order to preserve perceptions of independence. Even with such an analysis, the digitization of interventions invites technical and infrastructure vulnerabilities that make it nearly impossible to definitively prevent the intrusion of domestic and extranational militaries, or the harm that may result from their access to sensitive data. Like do no harm, however, the principle of independence should be used by organizations to understand a type of potential harm and take mitigating steps.

Conclusion: The need for an ethics of humanitarian experimentation?

The examples discussed here raise critical questions about the construction of digital bodies, the collection of personal, identifiable information, and the turn to immature technologies to improve aid delivery in unregulated or under-regulated airspace.

This article has argued for a recognition of the fact that experimentation is taking place, and that some of this practice stands in tension with humanitarian principles and imperatives. Neither technology nor the act of producing technology are neutral. The decision to experiment and the design of experiments are deeply political acts shaping the humanitarian space. As has been emphasized,

it is imperative to place these practices – these humanitarian technology uses – in relation to an important, albeit commonly disregarded, history of humanitarian experimentation, notably in the field of medicine. As the three examples of biometrics, data modelling and cargo drone aid demonstrate, humanitarian uses of such technologies in the name of humanitarian innovation may engender a range of possible vulnerabilities and harms. Exposing already vulnerable subjects to technologies that may cause them harm conflicts with general moral values as well as with humanitarian principles. It is of course particularly disturbing when humanitarian actors, whose stated aim is to assist vulnerable subjects, can be seen to reinforce underlying hierarchies and perceptions of humanitarian subjects as suitable test subjects.

This article has focused on fleshing out a taxonomy of the challenges and potential harms of humanitarian experimentation, with particular attention to the vulnerabilities and harms that experimentation may engender, and how we can begin a structured conversation about these harms. As highlighted above, the examples offered in this article merely highlight some of the potential consequences of experimental interventions in humanitarian action, and as such, they are intended as illustrative rather than comprehensive. To suggest that humanitarians should recognize what they are doing and that certain standards and requirements should be defined is, however, not to be seen as a replacement for the need to revisit crucial issues concerning the constitution of humanitarian problems as technology-solvable, as well as more fundamental issues such as the contribution of humanitarian practices to the reinforcement (rather than critique) of hierarchies that in turn makes it possible to think of certain subjects as "suitable" subjects of experimentation. Adding to this, it is important to emphasize that an important limitation of this "do no harm" approach – which early critics of Mary Anderson's "do no harm" approach have also highlighted – is that it may lend itself to an interpretation in which "the minimization of harm" is seen as "little more than a tactical question".[85] Indeed, the need to address the issue of harmful effect stemming from current practices of humanitarian experimentation should not be reduced to "little more than a technical question".

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85 David Campbell, "Why Fight? Humanitarianism, Principles and Poststructuralism", *Millennium: Journal of International Studies*, Vol. 27, No. 3, 1998, p. 500.