

EDITORIAL

Disruptive Innovations

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In this issue we publish an article titled “Innovative Methods for the Benefit of Public Health Using Space Technologies for Disaster Response.”¹ As anyone involved in disaster and public health emergencies knows, the most cited issues in an emergency situation after action reports or event analysis are communication barriers, deficiencies, and the absence of adequate resources. In addition, an often cited problem is a lack of information about events in combination with an absence of situational awareness. As we advance both the science and the practice of disaster medicine and public health preparedness, it is clear that we need new methods for both communication and information gathering for planning and situational awareness.

The Space for Health (S4H) Team Project, a project of the International Space University, may give light to some of these needed advancements in communication and information gathering. The project’s mission statement was “To identify challenges in the operation and coordination of natural disaster relief efforts among the disaster management, public health, and space sectors, and to recommend potential disruptive innovations to address existing technological, organizational, and regulatory approaches.” This project identified several key areas of importance:

- on-demand nano-satellite constellations,
- micro-unmanned aerial vehicles (micro-UAVs),
- medical diagnostic tools, and
- mobile self-contained disaster relief units.

The concept of using nontraditional satellite approaches is both novel and intriguing. As was discussed in the “Policy and Law” section of the article, there are regulatory, treaty, and other considerations that will have to be addressed. With that being recognized, this should be cause for further discussion and refinement versus a reason to abandon the subject. Although this may not tomorrow provide the communications and situational awareness enhancements we seek, if pursued, these enhancements could be realized in the coming years. Further research and proof of concept could not only make this a valuable tool to be deployed by emergency managers but also could lead to lower cost approaches and scalability that could make models of these approaches useful for both mega-disasters and regional events.

The mobile self-contained disaster relief units are an important concept for several reasons. The obvious one is the use of novel power sources to provide energy in disaster situations where utilities may be disrupted. One must also recognize the advantage whether using a power-cube-type model as described or a new model to be developed that integrates novel energy generations with other essential utilities in disasters such as communications, water, and the provision of shelter. This integrated model is preferred and not often planned in favor of the often used single-utility or problem solution, which creates the omnipresent silo model in disaster planning and response.

Last, the discussion of medical diagnostic tools provides discussions about a critical area in both disaster and public health emergency planning and response: the ability to provide medical triage, assessment, and intervention in areas under stress with limited resources and personnel. The current model of approaches to providing medical personnel to the scene of a disaster or covering multiple areas as well as responding to public health emergencies while requiring further refinement also needs to be questioned. With the advent of new medical technology including smaller and more portable devices for assessment and diagnosis and telemedicine as a field, we must consider how to use these devices. The ever-increasing knowledge in the field of telemedicine could be applied to provide both medical care, including assessment and triage, and management of public health emergencies by medical personnel and experts who are not at the scene or brought to the scene but instead are at a distant site, at their normal place of work, or at a remote central site that can support events anywhere in a region, nationally or even globally. The concepts and technologies now exist to allow this and are begging to be used. We need to create a new paradigm for disaster medical response not in place of current approaches but in addition to them.

The recommendations of this project were as follows:

1. An integrated solution based on nano-satellites or a balloon communication system, mobile self-contained relief units, portable medical scanning devices, and micro-UAVs could revolutionize disaster relief and disrupt different markets.

2. To ensure the successful implementation and use of the recommended solutions, stakeholders should be trained in 2 core areas: the technical design, operation, and maintenance of the innovations, and the medical, ethical, and humanitarian procedures and principles associated with disaster relief efforts.
3. Owing to the significant role that disruptive innovations from different sectors can play in support of public health during disaster relief, stakeholders should adopt methods to identify disruptive solutions and strengthen their capacity to integrate these solutions into the practices and procedures of their organizations.
4. Many of the mentioned technologies are designed and operated by private organizations. Public-private partnerships should be used to enhance disaster relief efforts. Governments can use the resources and expertise within the private sector to support disaster relief efforts. Additionally, coordination between civil and military organizations may be critical throughout the disaster relief process.
5. Research and development of the identified disruptive innovations is capital-intensive. Government-funded programs to support the research and development of innovations that promise to aid in disaster relief efforts and public health, such as those mentioned here, are required to stimulate technology markets and allow the development of innovations that advance current disaster relief mechanisms.
6. Many challenges on the policy and legal side persist when new innovations are to be used for disaster relief efforts. Existing laws and policies should be adapted and new regulatory frameworks created to facilitate the legitimate use of the recommended solutions.

Some may find these recommendations and concepts futuristic, idealistic, and in some cases, cost-prohibitive. The same could be said of many technologies we currently employ and that at the time of their invention and creation were also thought to be unobtainable. Think of what one may

have thought many years ago when told about the idea of launching a network of global satellites that would provide anyone with even a small handheld device exceptionally accurate location data. Think about the response to the idea that, when coupled with a database and a computer, even again a tiny handheld one, such a network could provide directions to any location on or off-road, the location of downed vehicles, and the tracking of relief assets and personnel. Today, would anyone imagine performing the actions we do in emergency management without the assistance of GPS? Even more, would anyone today think of the GPS system as anything but an expected technological creation and commonplace part of our lives?

We should not allow the concerns of these concepts and technologies in their infancy to serve as a barrier to proceeding to proof of concept and further development. One should take a moment to look at the images on the cover, think about the events depicted and the challenges faced, and then look at the technologies depicted and the integrated approach depicted. Although not here today, the integrated approach depicted or a variant of that as a result of this “disruptive innovation” approach could overcome many of the challenges we face when responding to disasters and public health emergencies. As we all know, the issues of communication difficulties and situational awareness are always present. Despite this fact, progress to overcome these challenges, while present, has not proceeded at the rate needed for emergency and public health response. As such, what is needed is what is described in the article: disruptive innovations.

REFERENCE

1. Dinas PC, Mueller C, Clark N, et al. Innovative methods for the benefit of public health using space technologies for disaster response. *Disaster Med Public Health Prep*. Published online 14 April 2015 doi: <http://dx.doi.org/10.1017/dmp.2015.29>.