How Technology Can Assist Us in the Wake of Natural Disasters

Disciplinary Perspectives

Restoring a populace to “normalcy” in the wake of a natural disaster such as a hurricane is always at the forefront of concern. Federal and local government are involved. Private companies often lend their hand. Even public forums such as social media can play an increasingly large role in both preparation and recovery. It is even more important now to look deeply into how certain disciplines come into play both before and after one of these weather events. The three scientific disciplines that are of utmost importance to the problem of how we handle such events are the natural sciences, formal sciences and social sciences. Within these disciplines, and more specifically, meteorology, computer science, and media studies can help us work through the gaps and generate new solutions for this important problem.

Meteorology is perhaps the first discipline that one thinks of when we discuss hurricane preparedness. It is most used by both experts to alert people of a weather event and the public. Before hurricane Katrina, R. W. Kates in “Reconstruction of New Orleans after Hurricane Katrina: A Research Perspective” states that as many as a million residents responded to evacuation calls. It is interesting that the full death toll of that storm is still not known today. Refugees ended up in locales across the country. Limitations of our current meteorology such as timeliness and perceived damage can still be improved upon. For example, if the severity of the storm and its effects on the levies in the area could have been better predicted, far better calls for evacuation could have been made. If you look at the preparedness that we had for the storms that have made landfall in 2017, it is arguable that even within those 10 years our preparedness is better because of the mistakes made during Katrina.

Computer science is prevalent across all disciplines, but simply in the case of these disasters it may also stand alone. Alexandra Samuel in “Does the Internet Help or Harm Our Ability to Weather Natural Disasters” shows that even simple advances in technology have greatly affected our ability to

deal with storms. Most people now always have a flashlight in their pocket via their smartphones. This advent is monumental if you note how many lives it can save by itself – let alone far greater advances in technology. An even more head-turning hypothesis is that we may soon have technology to combat storms outright. According to “Could Climate Engineering Technologies Weaken Hurricanes? (2017)” computer models are only theoretical now. These potential technologies are very promising but pose problems. If we want to start altering the weather on earth, that will hold many ramifications even in the wake of using this technology for good.

Information flow and how humans use it after a disaster is a field (media studies) that is just really being looked at for the first time due to how new its application is. Yury Kryvasheyeu in “Performance of Social Network Sensors during Hurricane Sandy (2015)” tells us that Hurricane Sandy left digital traces on Twitter. These so-called “social network sensors” can go a long way in improving emergency preparedness. However, this also does not always work for the better. For example, after Hurricane Katrina, many who remained away from New Orleans after the disaster found that digital connections to the community were insufficient in maintaining a sense of belonging. So, in this case, Irina Shklovski in “Technology Adoption and Use in the Aftermath of Hurricane Katrina in New Orleans (2010)” states that social networks were more helpful during the beginning stages of recovery and not as much towards the end.

It is without a doubt that these scientific disciplines and the advancements we have made even from the time of Hurricane Katrina have greatly improved our current level of preparedness. Meteorology is more accurate than it ever has been, but a storm can still change off its predicted track on a dime. New technologies such as weather engineering can help us perhaps prevent storms altogether one day, yet our models maybe do not yet predict damage well enough. Social media is extraordinarily influential in getting information to a population, but some people may become paralyzed from warnings

and end up doing less effective preparation as a result. These disciplines can technically be looked at by themselves, but even within that analysis they start to integrate with one another.

Conflicts

Three disciplines that are fundamental when defining the problem of “How Technology Can Assist Us in The Wake of Natural Disasters” are meteorology, computer science, and media studies. The respective concepts of these three disciplines that relate to the problem are weather prediction, increase in access to modern technology, and information flow after a disaster.

These concepts appear to almost flow from one to the other when looking down a long list of similarities contained within them, but the overlap inherent in the disciplines automatically creates conflicts. For example, weather prediction models are often created by computer software and simulations provided by the fields of computer science and engineering, amongst others. However, after these models are created, they are often shared on social media and misinterpreted by the public as predicting something that they were not meant to predict. This occurred during hurricane Irma when a clear majority of the public did not understand exactly what the cone of uncertainty referred to and chose to either take the prediction as gospel or not nearly serious enough. This is an interesting case on how the concepts almost work well together until a weak link is identified at the end of the chain.

Three theories for the disciplines are that weather models are good for the public, having access to increased technology is helpful after a disaster, and people sharing information can result in a more knowledgeable public. A major difference shows itself right away. People having access to the technology and sharing more information than ever generally dilutes the pool of information available. This is to say that it is harder for people to discern between what is factual and untrue. In turn, they will go on to share the version of the story or information that they think presents itself as true – exhibiting a cognitive bias. Meteorology in and of itself is a bit more secluded from the other two disciplines in this example, as it is generally practiced by a much smaller group of people who are qualified to do so.

However, in recent memory, meteorologists themselves have been unfortunately more subjective and less objective when presenting the data. Fortunately, this is more of the exception than the rule.

One can see that the disciplines align both through conceptual and theoretical frames, although they are fighting with each other a bit in both areas. Their similarities, however, really radiate out from the discipline of computer science (and technological advancements) in that both meteorology and media studies heavily really upon advancements in computer science to function at their highest capabilities and usefulness.

Common Ground

Technological advancements unite the disciplines of meteorology, computer science and media studies. Media studies in this field pertain to the connectivity of people in the aftermath of a natural disaster. In this scenario, there are two results of the use of this technology – it can either prove to help or hurt the population during the recovery period. The use of the internet, and specifically how the spread of meteorology (storm predictions) take place is a fascinating study in how technology can both help to save many lives and spread misinformation. Computer science is inherently tied into both disciplines – computer models of a storm and the propagation of ideas on social media.

An example of a technological advance that has greatly proven to help in the wake of Hurricane Katrina is the KatrinaHelp Wiki that was created only hours after the storm's landfall (Samuel 2017). The site contained lists of shelters, government resources and health and safety information along with a wealth of other assistance. The melding of computer science (web developing) and media studies (end user-controlled wiki page) is quite evident here. Although this site was launched after the strike of the storm, similar examples are seen with more recent storms such as Hurricanes Harvey and Irma. Here, forums such as Tropical Weather on reddit were instrumental in providing one of the most informative sources in the metrological realm (Strange 2017).

Samuel (2017) says that “The solutions technology enables are only as strong as the humans it connects.” So, even when the currents that run through these three disciplines are lined up with one another, it does not mean that the advances they provide are working for the benefit of those affected by disasters. The technologies themselves are often prone to failure – especially in the event of power outages. Another point identified by Samuel (2017) is that since these technologies are so prevalent in the wake of a disaster, we may come to expect them only to find them providing incorrect knowledge or even that the cost of providing the correct knowledge is too great and therefore not provided in a timely manner or not at all. A possible takeaway from the above is that these disciplines augment and improve one another, but even in their optimum states the general affected population is the main limitation in their effectiveness.

Response/Solution

Solving a problem such as a natural disaster with technology presents the problem solver with a multitude of angles to approach a solution that ultimately consists of helping people. In the case of hurricanes, ideas such as weakening storms via technology have been around for a while but now, they are merely science fiction (Forum for Climate Engineering Assessment 2017). Current technologies such as internet forums and other online sources of information have also proven to be a great help to populations in affected areas (Shklovsky 2010). However, integrating existing technologies that exist in the fields of meteorology, computer science and media studies can bring forth advent of a new technology in the way of providing victims with inexpensive, temporary housing.

This new temporary housing could be built upon existing products such as tiny houses or shipping container houses. Shipping container houses are interesting as a solution in this field because they are made up of a shipping container which is easily attached to a semitruck. This would allow for it to be extremely mobile and made accessible to a large part of population following a disaster.

Meteorologically, they should be able to withstand the rigors of not necessarily the natural disaster itself, but weather conditions that exist in the affected locale in the wake of the disaster. These homes could provide amenities such as plumbing and power in an area with hookups for such utilities. Computer science comes into play with the design and layout of such a dwelling. Computer models can be drawn up to efficiently utilize space and transportability of the final product or service. Media studies are important here because the affected population must be able to be reached to organize deployment of the temporary housing.

If any of these spokes are lacking in the creation of the final product, it may suffer from being either too expensive or too impractical in transportation. Even a small number of these dwellings could go a long way in making sure that the neediest parts of a population after a disaster find shelter and safety. For example, they do not necessarily have to be designed in such a way to accommodate a single family, but each unit could theoretically house two or even three affected families since at its goal it should only be looked at as temporary housing. Advancements and products such as this one could one-day lead towards even more inexpensive temporary housing engineered with materials that could be brought into areas in need in even easier fashions.

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