

Why Building Resilient Networks Matter – Sandy

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re-sil-ient/Adjective

1. (of a substance or object)
Able to recoil or spring back into shape after bending, stretching, or being compressed.

2. (of a person or animal) Able to withstand or recover quickly from difficult conditions.

Note from Beth: I've wrote about the importance of building resilience in networks given the complex and connected environment we live in today. So, when Pat Brandes from the Barr Foundation sent me this thought piece on building resilience of networks, it resonated on many different levels.

Lessons Learned About Resilient Networks from Super Storm Sandy by Pat Brandes, Executive Director, the Barr Foundation

As Hurricane Sandy was barreling up the Atlantic coast of the United States, a husband and wife in their early 90s, frail of body and mind though resolute (some would say stubborn) of spirit, finally gave in to

the pleadings of their family. The couple left their home on a barrier island off Long Island and evacuated inland. But given the size of the storm, even their safe haven was not without damage. They lost power, heat, and light. They could not cook. They had no internet access and – most distressingly for me – no phone service at all. This couple is my parents.

After two days I was driven to distraction with worry about their ability to deal with the cold. I wanted to get them to safety. But major obstacles were in my way. First, no trains, buses, or planes moved to or from New York City. The only way to travel was by car. But even if my parents could drive (they can't), and even if they had anyone nearby to drive them (they didn't), traffic lights weren't working. Many roads were closed. None of the bridges on or off Long Island were open. When they evacuated from their small island, I reminded them to take their cell phones and chargers. I assumed that would be our safety net. But when that system failed too, I realized I had not bothered to get the street address of where they would be.

Yet even despite these obstacles, on the night of the third day after the storm, I welcomed these two climate refugees into my home north of Boston.

How did it happen?

A network of grandchildren was activated. Aided by technology, they gathered and shared and used data to figure out where my parents were and how to get them out. Tweeting and texting various clues to each another, one cluster of grandchildren figured out the street address. Another cluster evaluated the alternatives and determined that my son (who was also without power on the 23rd floor of his apartment in lower Manhattan) had the best shot of making his way to them. So, he biked uptown and rented a car. Then, one of his cousins texted directions based on a new smartphone application called "Waze," which crowdsources data from nearby drivers to create real-time traffic and road reports and find the best routes. This cousin spent hours assisting my son via text, despite intermittent cell coverage and a dizzying maze of hazards – many streets and bridges closed, while others were a tangle of gridlock – until my son made his way out of the city and to my parents on Long Island. Crowdsourcing also provided information on gas stations that were still open (and where lines were actually moving). This was vital intelligence for an escape route that included a long drive to a ferry terminal at the eastern-most point of Long Island. From there they traversed Long Island Sound to New London, Connecticut, and then drove to Boston.

Upon arrival at my front door, my father's first words to me were, "I feel like I'm waking up from a nightmare." I led him and my mother to the sofa in my living room – complete with modern comforts like heat and light. We turned on CNN and watched together as scenes from New Jersey and New York flashed across the screen. "It's not a nightmare," I said, "It's for real."

Hurricane Sandy caused over 100 deaths in 10 states and left more people in the dark than any other storm in United States history. Up and down the nation's most densely populated corridor it caused damage currently estimated at \$50 billion. Somewhere during the frenzied media coverage of Hurricane Sandy, the press stopped using the word "hurricane." It no longer seemed adequate to describe this phenomenon of unprecedented power. And so Sandy became the "megastorm" or, fittingly for its occurrence so near Halloween, "Frankenstorm."

Sandy exposed our vulnerability to climate change. And while our climate is no respecter of race or class or ethnicity – the winds blow and the rains fall on everyone – this storm also exposed the deep inequities between our haves and our have-nots. Manhattan's wealthiest 20% have incomes that are, on average, 40 times that of the poorest 20% (\$400,000 vs. \$10,000). This puts New York City's economic disparity on par with places like Sierra Leone or Namibia. What that means in the face of a storm like Sandy is that, as the subways and trains started running again, and as much of Manhattan was getting back to some sense of normalcy, thousands of people in public housing were still without heat, water, electricity, or food. The homeless population in the city doubled to 80,000. Those with the fewest resources found themselves most vulnerable to the infrastructure failures.

Undoubtedly, the inequities in who bears the brunt of climate change will play out in similar ways on the larger global stage. Indeed they already are. In Haiti, for example, which was not even in the storm's direct path, Sandy wiped out 40% of the autumn crop. According to a report by the UN Office for the Co-ordination of Humanitarian Affairs, 450,000 people (including at least 4,000 children under five) are now at risk of severe acute malnutrition.

Regardless of economic status, however, some are always quicker than others to absorb disruptions like Sandy and bounce back. And it isn't unusual for the most resilient among us to bounce back even stronger than before. Meanwhile, when their peers are knocked down, they stay down for a long time. Some never regain their former footing. What distinguishes the two groups? My family's experience in the wake of Sandy underscores for me at least two essential ingredients for this kind of resilience – namely, robust networks and a sense of agency.

For weeks after the storm, the same network that helped rescue my parents has remained active on text, email, and social media. They have taken and posted pictures of the damage to my parents' home (including three feet of flooding in their first floor), registered them with FEMA, and helped them begin the recovery process. I had hoped this experience might convince these two nonagenarians it was finally time to give up living alone on an isolated island. But: no chance. Right away, my father, an avid striped bass fisherman, was on the phone with the Coast Guard to launch a search for his beloved 17-foot Whaler. It doesn't seem to matter that his short-term memory is going or that there are days when he loses track of where he is. He is a man on a mission.

In similar fashion, my mother has been directing clean-up crews by email via her iPad even though her fingers are so arthritic she has to use a stylus. She doesn't see well and can barely hear any more. But her mind is keen and she is making sure she gets estimates in advance. Each morning this old couple huddles together to plot the day and to scan the news for indications they can return to their home.

Their resilience is a result of both their supportive network and their own agency. Without the network to help them navigate the maelstrom of plumbers, electricians, demolition crews, oil burner replacements, insurance companies, and FEMA (to say nothing of their daily needs), they would be lost. But just as critical is their ability to shift their thinking – to see themselves not as helpless victims of great trauma, but as agents of their own destiny. With the elderly, it is all too easy to do things for them or just tell them what to do. Left to their own devices, they are often agonizingly slow. They get things mixed up. Their inefficiency tries our patience. It is hard to favor their agency over their fragility. Yet, that agency, that frame of mind is paramount if they are to weather whatever disruptions lie ahead.

This kind of resilience for absorbing and reacting to disruption is as important for individuals as it is for cities and communities. Sandy has added urgency to debates over how best to prepare New York City for a future of rising seas and

storm surges that are more frequent and more severe. While “hard engineering” solutions like barrier walls and dikes have their champions, the “soft infrastructure” (sometimes called “ecological”) approach is getting a lot of attention as well.

Architect Stephen Cassell, for example, proposed protecting New York’s financial district with a ring of tidal salt marshes and wetlands around lower Manhattan. Rather than try to shield the city from storm surges, such barriers would literally absorb them. Cassell says, “Our goal is to design a more resilient city. We may not always be able to keep the water out, so we wanted to improve the edges and the streets of the city to deal with flooding in a more robust way.” Another architect, Kate Orff, has proposed oyster-encrusted barrier islands to mitigate surges off Brooklyn. As Orff explains, oysters “agglomerate to make rich reef mosaics, and reefs are the most effective way of attenuating waves, because they go deep into the water column, stopping the velocity flow, where it starts to do damage.” What both of these proposals have in common is a focus on enhancing the city’s natural resilience by increasing its ability to absorb the disruption of surges.

In order to adapt to climate change we will need to learn another lesson from Sandy – in the face of major disruptions, centralization can be a major weakness, whereas networks are a source of strength.

Two weeks after Sandy hit, 300,000 people in New York and New Jersey were still without power. In addition, the recovery has been slowed because gas rationing is in effect. Even where there is ample supply, gas terminals and a significant number of gas stations have no power to pump gas. Conceived in the 19th century, our power grids are simply too centralized. And in the face of a storm like Sandy, our system is actually too big *not* to fail. This vulnerability places the health and safety of our population at great risk, and it can obviously be enormously disruptive to our economy. So what will replace our centralized power grids?

Once again, networks emerge as part of the solution. Micro-grids that can both be coupled and decoupled from larger grids are within technological reach. Photovoltaics, fuel cells, appliances that generate their own electricity, and ideas yet to be imagined will form decentralized component parts that can be networked together with distributed intelligence. The transition from a centralized grid to locally-generated power systems that can operate independently is not unlike the transition from mainframe to cloud computing. Local agency arranged in networks that can decouple to operate independently is essential to resilience.

As we reflect on Sandy and its implications for the future of our country, we also need to consider the impacts of climate change on poor nations. The Statue of Liberty and Ellis Island were severely damaged and the statue has only just been illuminated again for the first time since the storm. Through our nation’s history, this light has served as a beacon to millions looking for a better life. In the next century, as millions more the world over are displaced by climate change, we can be sure that the pull of that beacon will remain strong.

This is all the more reason to understand and invest in resilience.



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