The Paradox of Emergency Management

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ABSTRACT

The role of Emergency Management is to respond effectively to a major emergency that cannot be handled by the day to day independent services such as fire fighters, police, and medical response facilities. However, normal evolutionary processes typically make the ability to respond to disasters more difficult. This leads to long term decision and policy conflicts and incompatibilities about desirable goals, with implications for practitioners and system designers.

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The mighty telescope looks afar,
But finds no place to park a car.
Samuel Hoffenstein – Pencils in the air.

INTRODUCTION

The principal goal of Emergency Managers, in responding to a major disaster, is to minimize deaths, injuries, and damages to infrastructures. They also seek to facilitate repairs to those facilities and alleviate associated shortages most needed to accomplish this goal. However, in the period between disasters, most societies tend to make decisions and take actions that will make a similar future disaster more likely to increase deaths, injuries, and damage to infrastructures (Turner, 1976, 1978). This situation is very prevalent almost everywhere in the world. This paper will present a few of the many examples for the US, particularly as they relate to critical infrastructure decay. It concludes with implications for practitioners and system designers..

EXAMPLES

Turner (1976, 1978), who studied some 80+ major British disasters that had poor response properties, came to the conclusion that the longer the period between two similar disasters in the same general area, the poorer was the response to the second disaster. The precursor to Sandy was the 1938 Northeast Hurricane that came ashore in Rhode Island, but in 1938 the number of people living on the shores and in massive tree-covered rural areas as far less than in 2012. U.S. states subsequently approved massive housing developments on the shores which many professionals and government officials knew were risky areas in which to live. However, first low cost summer cottages were built and then later, year around communities built right up to the high water line. Most buyers who had never

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experienced the risks the sea represented and were never warned of these risks by local governments or the advertisements of real estate companies.

Turner's study made it quite clear that societal and economic factors make the public, over time, largely unaware of real risks with respect to likely local disasters. Ultimately, the creation of effective Emergency Management systems is dependent upon involving the public in all phases of EM processes (Turoff et al, 2013).

A lot of this is due to the economic pressures to generate more wealth by changing land use zoning and reducing requirements to make structures more secure. For example, high dunes could greatly reduce the impact of hurricane surges on houses. But even today, some homeowners on the NJ shore that were hit by Sandy object to raising the dune heights. Those homeowners believe the new dunes might provide federally owned easements that would allow the pubic easier access to their beachfront, and might destroy the view of the ocean from their homes, both of which would lower their home's resale value.

In the case of Sandy in 2012, the prior hurricane was the 1938 hurricane (Scotti, 2004). Anyone reading the Scotti book would be able to predict what a similar hurricane hitting the New Jersey shore would do to that area. The 1938 hurricane was actually stronger but it went ashore in Rhode Island. After Sandy, the Governor of New York claimed the reason they did so badly was that there was no prior disaster to learn from. Of course, in 1938, much of the East Coast shore was not filled with small towns and most housing was cheap summer homes. However, reading the book sounds a lot like Sandy in many ways. No politician has pointed out the connection and one worries that not many Emergency Managers have made that connection.

One component of a major disaster is that it is one where the outcome is a lot worse than anyone expected. Katrina is an excellent example and the overriding cause of the disaster was to save money on preparedness and make more money by risky development decisions, such as more waterways through the area to promote shipping. A good example of the money saving was that the new pumps in the area that was flooded stopped working when the levy gave way, while the much older pumps from before the second world war kept working. Those older ones were built to work underwater, while the new ones were not and cost less. A Katrina-like disaster was predicted by a professional article in Scientific American due to new waterways to produce more income from shipping (Fischetti, 2001) and was essentially ignored.

In Sandy, the New York hospital that had to close had moved its generators to the second floor but did not spend the money to rewire the power lines and electrical controls on the first floor. The famous BP disaster is clearly a major case study of the wrong trade-off between saving money and increasing the risks of a disaster (Turoff, 2012). Perhaps the BP case is better stated as not lowering profits by closing the well to make needed repairs.

One could come up with endless other examples of saving money and increasing risks as a result. These included in recent years collapsing bridges with cars and trucks on them, poison materials found in water systems serving the public, large mudslides caused by excessive logging wiping out areas, etc. In many of these situations, there were predictions by professionals that were ignored by local leaders. Destruction of forests used to be a developing country problem, but in the U.S., we add new towns to logged areas and we are starting to have the same problem.

CRITICAL INFRASTRUCTURES

In the U.S. today the principal problem we are facing is the decay of our Critical Infrastructures. Let's start with one particular dimension of the situation with respect to U.S. infrastructures. Figure 1 was data given to the author in the late 1990's by a private communicator who could not identify the source and the author has never been able to find such data despite a number of attempts on the Web. In support of this data, the American Society of Civil Engineers published a 2013 report (ASCE Report, 2014) on U.S. infrastructures, which they grade on an A to F scale like university grades. Their 2013 annual report graded most U.S. infrastructures D or D+ and the historic rating has been going down over the past decade. Therefore, we have support that indicates these curves are meaningful.

As one will notice (for Figure 1), curves of the age of an infrastructure are far more effective recognizing fundamental problems than an arbitrary grade for one

year. These curves should be a regular product by some official U.S. government agency and should be made pubic so all concerned citizens can gain a better sense of what has been happening. Local officials in the U.S. should be responsible for updating infrastructure but it is clearly something they are ignoring and they are not letting the public know what is happening. Probably they hope it will be the problem of next generation of leadership. This will not change until there is significant pubic awareness and involvement in demanding improvement.

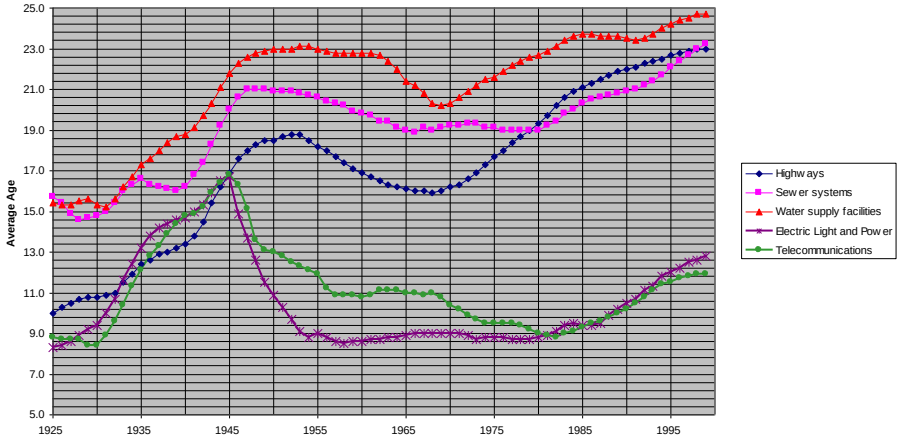

Figure 1: Average Age of Various U.S. Infrastructures:
Highways: blue; Sewer Systems: pink; Water System Facilities: orange; Electric light and power: purple; Telecommunications: green

In figure 1, we see an increase in age from around 1930 until after World War II when there were both large decreases and at least some steady state of a relatively constant age. Then around 1970 and slightly later, the age starts increasing and, one suspects, increasing for 2000 to the present given the Civil Engineering ratings and many recent examples of failures. The ASCE Report 2013 (2014) pointed out that 1 in 9 (67,000+) of 607,380 U.S. Bridges are deficient and another $8 billion a year needs to be added to the current $13 billion a year to correct the situation by 2028. Bridges in that report had the only high grade C! Increasing age is a result of a decrease in replacement of old infrastructure.

Taking electricity as an example, there are 3,000 independent utilities making up the national grid under the control of state regulatory agencies. Quoting from the Economist, October 18th 2014:

> "Nobody knows the true state of the national grid until something goes badly wrong, as it did in October 2012 when Hurricane Sandy left almost 8 million people powerless, some for weeks. The number of big outages, defined as those affecting more than 50,000 people, has more than doubled in the past ten years."

The federal government does not have the authority it should have to set improvement standards over the whole network. This leads to local decisions which can be less than optimal when local regulatory bodies become more partners than regulators. For example, electrical utilities in the northeast of the U.S. have the problem of trees growing near electrical lines and in the past, the utilities would do a yearly pruning or even down trees that might fall on the lines in a severe storm. At one point some years back, they drew up agreements with neighboring utilities in other states so that, for example, if New Jersey had a severe storm and needed more line repair crews the utilities in neighboring states like Pennsylvania and New York would agree to send in some of their repair crews to help out for free. The states' regulatory agencies approved this plan to reduce expenses and the number of full time crews for tree trimming. When Sandy hit, all the utilities across the neighboring states were too busy trying to fix all the power lines in their states and could not send crews to the other states. New Jersey had to pay crews from as far away as California to fly with their equipment to help to fix the damage in New Jersey. It was prohibitively expensive and the utilities after Sandy had to request raises in their rates to pay of those expenses, which were far more than they saved by reducing their tree trimming crews in the past years. The same state regulatory body that had approved the prior saving had to turn around and raise rates quite a bit to make up the cost of their prior mistake in a regulatory decision. The result had been poor response to the Sandy disaster and more long term costs to the public.

A summary article for one utility appeared in the Newark, New Jersey, Star Ledger (February 27, 2014) and pointed out:

- JCP&L spent $750 million to restore service and repair devastation. Tens of thousands of trees were cut and cleared, thousands of utility poles were replaced, and hundreds of miles of new wire were rolled out.
- About 1.1 million customers had rates raised by about 4.5%
- The rate counsel office found that they had not performed adequate tree trimming during the years that preceded the storms (Sandy, Irene, an October 2011 snowstorm and a November Nor'easter).

CONCLUSIONS AND IMPLICATIONS FOR PRACTITIONERS

The key cause of these problems is the fact that the structures of our societies tend to be based upon hierarchical reductionism. We take objectives and serious problems and divide each one up into smaller objectives and/or simpler problems. The result is organizations that are divided up the same way to focus on one particular smaller objective or one particular smaller problem. Each infrastructure, for example, is largely treated as if it were completely independent of any other infrastructure. An electric utility is not functionally connected to any other form of energy, nor is it connected to those in charge of the road network, police, or medical services. There is no joint planning activity to deal with any potential emergency.

A straightforward example is the day to day use of ambulances in a major suburban area (Calle and Turoff, 2011). There is a center to direct the distribution of ambulances in a wide area and there are a number of different types of ambulances and configurations tailored to different types of accidents or emergencies. If the phone call for an ambulance comes to the ambulance center, the operators know how to ask for the information that allows them to send the "right" ambulance. However, most calls come to the fire department or the police department numbers. The operators taking those calls have no training on what to ask and these other organizations refuse to spend the money to train their operators to be able to handle effectively the medical questions. When a serious emergency occurs this leads to a lot more chaos. There are no organizations or political officials that have the authority to overcome this situation. It is a problem that has no real recognition by the local government or the public. But it interferes with the effectiveness of responding to regular normal emergencies and gets even worse if the location is faced with a more serious situation.

The problem we face is the lack of coordination or collaboration between different organizations that should be planning for collaboration to handle emergencies, but which have no current official communications ability to carry out that process.

The implication for emergency managers is that they must take proactive steps to warn the pubic and policy makers about needed improvements in infrastructures and regulations. The also need to put more emphasis in collaboration among many different organizations that would need to work together during a disaster.

INFORMATION SYSTEMS IMPLICATIONS

There are very significant changes that must occur to the design of Emergency Management Information Systems and the supporting functions for Emergency Management Operations, to support more communication, coordination, and collaboration among different organizations. Some of these have been mentioned in the prior literature.

1. It cannot be determined ahead of a disaster all the people are who are going to be members of the Information System. One must be able to create new members quickly during the disaster. Also many temporary problem solving groups may need to be formed dynamically (Turoff et al, 2004a)
2. Since disasters do not recognize man-made boundaries, any local systems must be able to integrate what they are doing in the same disaster and share professionals and resources (Turoff et al, 2009).
3. We need to develop auditors for determining the degree of preparedness of any organization. We should start out with medical facilities and local government organizations but move on to corporations that have needed resources like food, hardware, water, gasoline, construction equipment, etc. All the critical infrastructures would be involved (Turoff et al, 2004b).
4. All verbal phone calls should be converted to text so that natural language processing can be applied and the system can immediately determine what

combination of different persons and organizations might be able to use or respond to the information. In many cases, a lot of incoming verbal information may be about a common problem (Verna, 2011).
5. The system needs to be able to notify all the possibly concerned parties or organizations about an event of common interest (Turoff et al, 2004a).
6. Not only the information about a current event, but also the best information on the results of actions taken to improve any situation, is critical to evolving the best responses and avoiding "threat rigidity effects" on response personnel and organizations (Plotnick and Turoff, 2010).
7. All emergency community plans and their evaluation by emergency auditors must be freely available to the public (Turoff, et al, 2013).

We have reviewed the combination of factors that would put us on a meaningful path to effectively mitigating the results of disasters, and encourage local communities to make meaningful investments and responses in dealing with natural disasters. For the terrorist problem, we have to add the property of dealing with the worst possibilities. Turner (1976) and others point out this is not consistent with human nature. For example, with all the talk about Ebola, there seems to be no stated concerns that the fanatics who are willing to wear bombs might also be willing to get themselves infected and travel to large cities to start the spread of this disease.

In 1973, the Office of Emergency Preparedness (OEP) in the Executive Office of the President was terminated by President Nixon along with the Office of Science and Technology. OEP had total Command and Control authority in declared national disasters. It issued a final report in 1972 that contained a strong set of recommendations on how Emergency Management in the U.S. could be improved (Turoff et al, 2009). They included (in short form):

1. Planning is essential for any community likely to be affected by a disaster.
2. Vulnerability analysis is a prerequisite to effective disaster preparedness for the government and the citizens.
3. Public awareness of the threats is essential.
4. The value of past investment in prediction and warning is clearly demonstrable.
5. The objective of mitigation is to find ways to reduce the vulnerability of people and property to damaging effects.
6. There is a favorable benefit-cost ratio in taking early measures when a disaster is imminent.
7. The most immediate need is to apply the scientific and technological knowledge already existing to carry out the Emergency Management missions.

The above 1972 report, including most of the details really could have been published today and that is a very unfortunate situation. It well defines the specifics of the current "new" concept of resiliency; many like item 4 are still major problems.

The crux of the recommendations in this section are 1) the involvement of the public, community organizations, and the private sector in planning, response and recovery, and 2) understanding the implications of the threats and how they may be mitigated. This is the only way that the funds for mitigation will receive the necessary public support. Plans and mitigation investment options must be pubic information. Options for public participation in response must also be available.

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